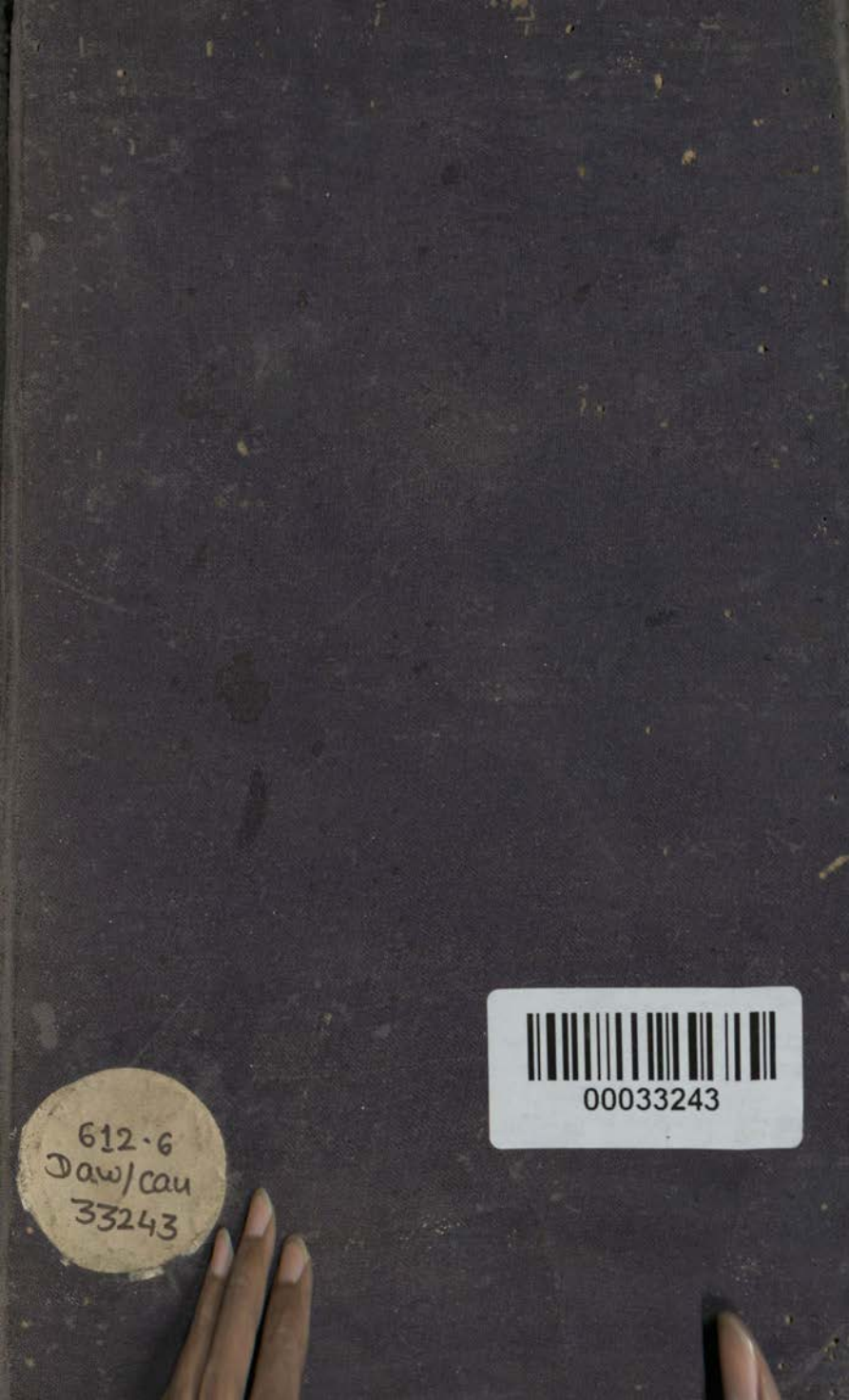
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THE CAUSATION OF SEX IN MAN

THE CAUSATION OF SEX IN MAN

A NEW THEORY OF SEX BASED ON CLINICAL MATERIALS

TOGETHER WITH CHAPTERS ON

FORECASTING OR PREDICTING THE SEX OF THE UNBORN CHILD

AND ON THE

DETERMINATION OR PRODUCTION OF EITHER SEX AT WILL

BY

E. RUMLEY DAWSON

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AND FELLOW OF THE ROYAL SOCIETY OF MEDICINE

FORMERLY RESIDENT OBSTETRIC HOUSE PHYSICIAN TO THE WESTMINSTER HOSPITAL

"OMNE VIVUM AB OVO"

SECOND EDITION

WITH TWENTY-TWO ILLUSTRATIONS

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To the Memory

OF

A MEDICAL MARTYR

THE LATE

IGNATIUS P. SEMMELWEIS

FORMERLY OBSTETRIC ASSISTANT TO THE VIENNA HOSPITAL

THIS BOOK IS DEDICATED

AS A RESULT OF PROPOUNDING AND ADVOCATING A THEORY OF THE CAUSATION OF BLOOD-POISONING DURING CHILDBIRTH, NOW UNIVERSALLY ADMITTED TO BE CORRECT, BUT NEW THEN AND THEREFORE DISBELIEVED, HE WAS DESPISED AND RIDICULED BY HIS COLLEAGUES AND TEACHERS, FINALLY DYING INSANE

A VICTIM

TO THE RELENTLESS PERSECUTION AND CONTEMPTUOUS OPPOSITION TO WHICH HE WAS SUBJECTED

"THERE IS NOTHING MORE THANKLESS THAN THE ATTEMPT TO INFLUENCE ANY FIELD OF PUBLIC OPINION."

PREFACE TO THE SECOND EDITION

THE preparation of this new edition has enabled me not only to revise it, but to explain and elucidate some of the difficulties experienced by my readers.

I have therefore included many more cases, and examples explanatory of different points have also been added. In order to do this and yet keep the volume nearly to its original size, some matter not strictly relevant to the chief subject of the book has been omitted.

Further experience and testing of the theory have led to but little alteration or modification of the conclusions therein contained. The book has not only shown members of my own profession how to determine the sex of the next child for some of their patients, but that I had also succeeded in making the book comprehensible, and practically useful to the intelligent layman, is evident from the receipt of many grateful letters from readers of the book, previously quite unknown to me; I therefore hope that this revised edition will be more than ever helpful to all who desire to exercise a reasoned control over the sex of their offspring.

The appearance of this new edition now must be deemed most opportune, for owing to the abnormally heavy drain on the manhood of the country, the birth of sons to the nation becomes an Imperial necessity. And here I wish to

point out once again, that those who desire to study the Human Family *must*—as was stated in *The Mendel Journal*—" quit the experimental garden and cloister, and pass out into the world of his fellows "; for from his fellow-creatures, rather than the invertebrata and plants, will he learn the details and mysteries of human families, and so gather confirmation of the views expressed in this book.

E. RUMLEY DAWSON.

THE ELMS,
TEDDINGTON,
MIDDLESEX.

PREFACE TO THE FIRST EDITION

I HAVE written this book, not as the outcome of a sudden inspiration or guess, but as the result of prolonged and careful study; hence I trust the reader will form his conclusions thereon only after careful perusal of it.

The problem of the Causation of Sex in Mankind has always been a fascinating one, and only recently it has been described as " on the borderland of the insoluble."

Some hitherto insoluble questions have been solved, for example, by Marconigrams, Radiograms, and Submarine Warships; others are being assailed, for both Arctic and Antarctic expeditions are attempting to solve the Polar question, while the conquest of the air by aërial machines and dirigible balloons will not apparently be long delayed.

Such examples, therefore, encourage the attempt to solve the question of the Causation of Sex, and supply a valid reason for the production of my book, the more especially as I claim to have discovered Nature's secret.

This theory is built up essentially on clinical material and facts, and thus differs from Schenk's theory, which recently startled the world. The latter looked like an attempt to give a scientific flavour to the old nursery rhyme that—

" Sugar and spice and all things nice,
That is what girls are made of."

It was never seriously credited, however; for by the application to Schenk's theory, or rather hypothesis, of the one

well-known clinical fact of the occasional simultaneous birth of both a boy and a girl, it was at once shown to be quite untenable.

In the chapter on the Determination of Sex I have given general rules only, as each individual case must be separately worked out, preferably by the person's own private medical attendant.

Of the illustrations, nine are new and original. The source of the remainder is given in the text: all have been redrawn, and some have been modified or simplified so as to render certain points clearer to the reader; while for the loan of Figs. 14 and 21, taken from Bland-Sutton and Giles' "Diseases of Women," I have to thank Mr. Bland-Sutton and his publishers, Messrs. Rebman, Ltd.

For many of the facts used I am indebted to others; the fitting of them into the mosaic of the theory I claim to be my own.

E. RUMLEY DAWSON.

CONTENTS

CHAPTER		PAGE
	INTRODUCTION	1
I.	THE ANATOMY OF THE FEMALE GENERATIVE ORGANS	5
II.	PHYSIOLOGY — OVULATION — THE CORPUS LUTEUM — PUBERTY—MENSTRUATION—THE MENOPAUSE	17
III.	THE FORMATION OF OVA	32
IV.	THE FORMATION OF SPERMATOZOA	36
V.	FERTILISATION	38
VI.	THE THEORY AND ITS EXPLANATION, TOGETHER WITH SOME CONFIRMATORY VIEWS	46
VII.	DOES THE MALE PARENT OR FATHER INFLUENCE SEX?	56
VIII.	CASES OF UTERINE PREGNANCY WHICH PROVE THE THEORY	63
IX.	CASES OF EXTRA-UTERINE PREGNANCY WHICH PROVE THE THEORY	67
X.	CASES OF PREGNANCY AFTER OPERATIONS ON THE OVARIES, WHICH PROVE THE THEORY AND SHOW THE EFFECT ON CHILDBEARING OF SUCH OPERATIONS	76
XI.	CASES OF PREGNANCY IN ABNORMAL UTERI WHICH PROVE THE THEORY	82
XII.	THE CORPUS LUTEUM AS A SIGN OF PREGNANCY	86
XIII.	THE MIGRATION OR TRANSMIGRATION OF OVA	90
XIV.	PREGNANCY IN THE MAMMALIA	97
XV.	WHY MORE BOYS ARE BORN THAN GIRLS	105

CHAPTER PAGE

XVI. THE INFLUENCE OF LATERAL DECUBITUS ON THE DETERMINATION OF SEX - - - - - - 115

XVII. THE PROPORTION OF THE SEXES IN INDIVIDUAL HUMAN FAMILIES - - - - - - - 122

XVIII. MULTIPLE CONCEPTIONS OR PLURAL PREGNANCY - 132

XIX. DOES A DISEASED OVARY LEAD TO DISEASED CHILDREN ? 146

XX. HERMAPHRODITISM - - - - - 154

XXI. CASES THOUGHT TO DISPROVE THE THEORY - - 157

XXII. THE ALTERNATE ACTION OF THE OVARIES - - 170

XXIII. THE FORECASTING OR PREDICTION OF THE SEX OF THE COMING CHILD - - - - - - 181

XXIV. DIFFICULTIES AND SOURCES OF ERROR EXPLAINED - 197

XXV. A CONSIDERATION OF THE PRE- AND POST-MENSTRUAL THEORY OF SEX DETERMINATION - - - - 208

XXVI. THE DETERMINATION OR PRODUCTION OF EITHER SEX AT WILL - - - - - - - 214

INDEX - - - - - - - - 221

LIST OF ILLUSTRATIONS

FIG.		PAGE
I AND 2.	VIRGIN AND MULTIPAROUS UTERUS	5, 6
3.	FRONT VIEW OF UTERUS IN RELATION TO SURFACE OF BODY	8
4.	ABNORMAL UTERI	10
5.	POSTERIOR VIEW OF OPENED UTERUS, OVARIES, ETC.	13
6.	OVARY SHOWING FOLLICLES CUT ACROSS AND ONE JUST RUPTURED	15
7.	GRAAFIAN FOLLICLE, CONTAINING NEARLY RIPE OVUM	15
8.	OVULATING OVARY, MAGNIFIED SECTION	18
9.	CORPUS LUTEUM	19
10.	A HUMAN OVUM	34
11.	HUMAN SPERMATOZOA	36
12.	A HUMAN OVUM, SHOWING ITS UNIVERSALLY POROUS CELL-WALL	40
13.	AN INVERTEBRATE OVUM, SHOWING THE MICROPYLE	41
14.	A RECENTLY PREGNANT FALLOPIAN TUBE AFTER COMPLETELY ABORTING. CORPUS LUTEUM IN THE OVARY	88
15.	SHEEP'S UTERUS, UNOPENED	97
15A.	SHEEP'S UTERUS, OPENED	98
16.	PREGNANT COW'S UTERUS, SHOWING BULL-CALF IN UTERO	*facing* 101
17.	PREGNANT SHEEP'S UTERUS, SHOWING TWIN LAMBS IN UTERO	102

FIG. PAGE

18. POSTERIOR VIEW OF UTERUS IN SITU, SACRUM REMOVED - 116

19. RIGHT-SIDED SALPINGITIS CAUSING RIGHT-SIDED STERILITY 125

20. POSTERIOR VIEW OF UTERUS, SHOWING SITES WHERE ACCESSORY OVARIAN TISSUE MAY BE FOUND - - - 160

21. FRAGMENT OF OVARY CONTAINING A CORPUS LUTEUM AFTER SUPPOSED COMPLETE REMOVAL OF BOTH THE OVARIES, ETC. 165

THE CAUSATION OF SEX IN MAN

INTRODUCTION

EARLY in the year 1887 my attention was first called to the fact that the great problem of the Causation of Sex in Mankind was still unsolved.

The inquiries which I then began to make soon showed me how much in the dark the medical profession is on the subject.

The whole question of the Causation of Sex in Mankind had been hedged around, encumbered and obscured with observations *ad nauseam* on the eggs of the invertebrata; on worms and tadpoles; on sponges, and plants; on bees, and water-fleas; and lastly, on hens' eggs, to which nothing more dissimilar could be found than the human egg or ovum.

If ever it be true that "the proper study of mankind is man," it is in this study of the causation of sex, and therefore I have made it chiefly a clinical study.

Among the large number of theories which had been advanced, the great majority were quite untenable, and were propounded without any clinical evidence or facts to support them; several others I found had been suggested which were diametrically contradictory to a theory which some former writer had advocated. A few of these I mention in the text.

As a general practitioner of medicine, the daily round of work, the ever-present necessity of earning one's living, sadly interfered with, and was hardly conducive to, close study of and inquiry into such an engrossing subject, and so progress was slow; but we must remember, as Dr. Samuel

Johnson said, " it is dangerous to quiet our uneasiness by the delusive opiate of hasty persuasion "; for the answers to most great questions have only been arrived at after much patience combined with persistence and sustained work.

It was not, therefore, till some thirteen years after first beginning the study of the Causation of Sex that I ventured, in December 1900, to bring the subject before the Obstetrical Society of London: it is remarkable, but it was the first time that the subject of the Causation of Sex in Mankind had ever been discussed by the Society! Innovations, however, rankle with many, and, as was to be expected, but little knowledge of the subject was shown, and much of the criticism of the paper was irrelevant and inaccurate.

The reception of the paper did not discourage me, and the following eulogistic notice of it from the pen of the then President of the Obstetrical Society, Mr. Alban Doran, F.R.C.S., appeared in vol. xliii. 1901, pp. 49 and 50, of the Society's Transactions:

" A very remarkable monograph on ' The Essential Factor in the Causation of Sex: a New Theory of Sex,' was read in December by Mr. E. Rumley Dawson. This communication was prepared after long study of cases of removal of one ovary, and of families where one sex predominated or prevailed entirely. . . . The boldest theory in this singular monograph was the assertion that the sex of the child depends upon which ovary supplied the ovum fertilised. This paper was strongly criticised in a very active discussion by several obstetrical and gynæcological authorities; but the author, who showed great dialectical ability both in his written monograph and in his reply to his critics at the meeting, stoutly maintained the scientific value of his views. This memorable discussion on a sex problem—a subject always of interest, though on the borderland of the insoluble —was further remarkable as being the last piece of work done by the Obstetrical Society in the nineteenth century."

Having thus led the way, I continued to note and observe, and the gradual collection of facts and cases stimulated me to further efforts, for I found new patients and new cases supplying almost daily fresh points or facts with which to build up and maintain my theory.

Each individual fact brought forward in support of my theory may have no great force by itself, yet when we come to add together the separate facts, the number of points in favour of the theory form in the aggregate proof so convincing as to leave very little room for doubting its accuracy.

The present book, then, is the result of this further study; the original paper is incorporated with it, the whole has been rewritten, and the additions thereto more than equal the original observations.

I have throughout endeavoured to support and substantiate every statement, proposition, or conclusion, either by extracts from well-known authorities or by clinical cases, and thus gradually to build up the theory on ascertained facts; but no one save those who have hunted up cases in medical literature can be aware of the great difficulty experienced in finding perhaps the very item or fact we are looking for. In this way scores of cases which might have been used are found to be useless owing to the remarkable manner in which authors have failed to note the sex of the child born, or from which side an ovary was removed, or in which half of a double uterus the child was contained. I have had most exasperating experiences in this way, and writing personally to the authors has been no more successful: thus, in one case, though the weight of the child is given, and a careful dissection was made of *its* heart, *its sex* was unaccountably omitted; in others we get the weight and length, but no sex; and, finally, a case is described of opening the mother's abdomen, removing a living child, elaborate measurements of *its* head are given, but though the ovaries were removed, they are not described, neither is the sex of the child given !

I have thus found my investigations repeatedly hampered by incomplete records, hence the number of cases is less than it might have been.

I have claimed, and repeat my claim, that my theory is a new one: in dissociating as I do the male parent from any influence in sex causation, my theory essentially differs from those old-world theories which some critics thought were similar. Further, I prove my theory practically and with clinical material; no attempt has previously been made to

utilise the sexually differing families daily met with; and such subjects as extra-uterine pregnancy; pregnancy in abnormal uteri; multiple pregnancy; the migration of the ovum; and why more boys are born than girls; are all used to prove the Causation of Sex in Mankind for the first time.

Confirmation of the correctness of the theory is practically shown by my being able not only to forecast the sex of the coming child, but also to determine either sex at will.

I have endeavoured to give chapter and verse for most quotations and cases. I am well aware of faults in the book, but I must claim the reader's indulgence, for, apart from the claims of my daily work, which often rendered it impossible for several days and weeks together to either write or study, the mere collection of so many cases necessarily prevents the narrative running along in the smooth way one might wish; but they were essential to prove the theory.

And again, in order to emphasise the different points I have had to utterly disregard repetition: emphasis requires repetition, and hence I fear the narrative suffers thereby.

The absorbing interest of the subject, however, will override the literary deficiencies, for that the subject of sex is of the greatest interest and importance is surely indisputable; and all must agree with Havelock Ellis when he says that—

"Sex is the central problem of life."

CHAPTER I

THE ANATOMY OF THE FEMALE GENERATIVE ORGANS

A COMPLETE anatomical description of the whole of the female generative organs being beyond the scope or necessities of this book, only the following abbreviated account of the internal organs essential to reproduction will be given.

THE UTERUS or womb is roughly a pear-shaped muscular organ, containing a small cavity which is capable of much

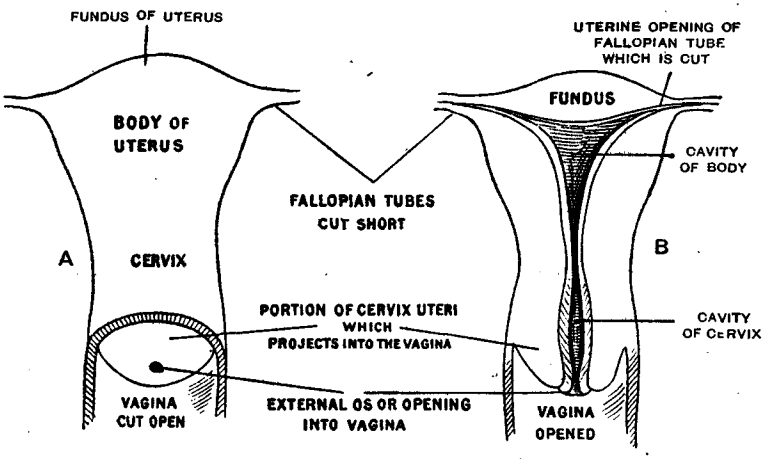


FIG. 1.—FRONT VIEW OF VIRGIN UTERUS.

A. Unopened. B. Opened, by removal of anterior wall, showing its cavity.

dilatation. It is situated within the bony pelvis, to the walls of which it is attached or slung by folds of peritoneum, known as the broad ligaments. These pass outwards, like outstretched wings, from the sides of the uterus, and so form suspensory ligaments for it. In front of the uterus is the bladder, while the rectum or last portion of the bowel is behind it.

The uterus is freely movable, and consists of a body, the upper larger portion, triangular in shape, and a cervix or narrowed cylindrical portion which projects downwards into the upper part of the vagina or external genital passage.

The uterus varies in size slightly in different women, and considerably whether it be in a virgin or multiparous state.

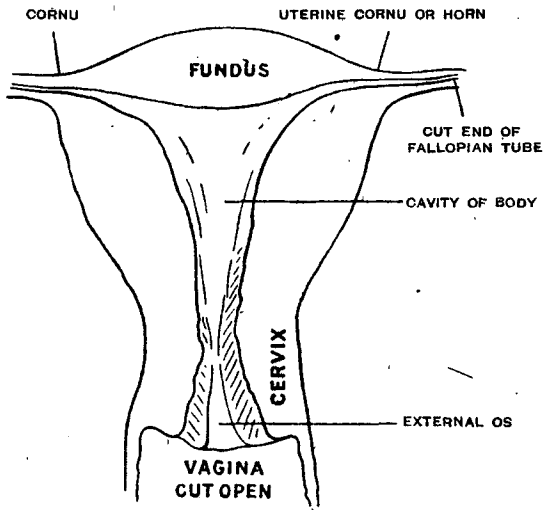


FIG. 2.—UTERUS OF WOMAN WHO HAS BORNE CHILDREN.

Anterior wall removed to show cavity.

The position of the body of the uterus is such that, as *Playfair*[1] says:

"The body of the uterus is very generally twisted somewhat obliquely, so that its anterior surface looks a little towards the right side."

This facing towards the right side by the anterior surface of the uterus leads to the left side of the uterus being carried to the front, so that when the woman is in the dorsal position, or lying flat on her back, the right ovary and the uterine opening of the right oviduct or Fallopian tube are lower in the pelvis than the left.

[1] Playfair, "The Science and Practice of Midwifery," 1898, p. 33.

Spiegelberg[1] says:

"The uterus is not only inclined forwards, but almost always towards the right side also, while the left side is rotated forwards, a position caused mainly by pressure of the rectum during development, and by the weight of the organ in the right lateral posture, which is the commoner."

Garrigues[2] says:

"The mother's rectum causes a partial rotation of the uterus, by which its left edge is carried a little more forward than its right edge."

Parvin[3] too admits that—

"A slight rotation occurs by which the left side is thrown toward the front, and the right side backward."

Dr. G. Moorhead reports a case where—

"There was lateral rotation of the uterus, so that the left ovary and tube came into relation with the anterior abdominal wall just external to the middle of Poupart's ligament on the left."

This rotation is generally believed to be due to the presence of the rectum, which stretches from the left sacro-iliac joint obliquely towards the right side to reach the mid-line of the sacrum.

As constipation is so universal with women, and as the rectum is the portion usually most distended, the explanation is doubtless the correct one.

Hart and Barbour[4] say:

"Rectal distension displaces the uterus forwards and to the right side."

The variations in position of the uterus due to distension of the bladder are more evanescent; the pressure comes to be directed on to the anterior surface of the uterus in a direction backwards and upwards.

Apart from the oblique twist of the uterus, the whole

[1] Spiegelberg, "A Text-book of Midwifery." New Sydenham Society Translation, 1887, p. 32.
[2] Garrigues, "Science and Art of Obstetrics," 1902, p. 83.
[3] Parvin, "The Science and Art of Obstetrics," 3rd ed. 1897, p. 71.
[4] Hart and Barbour, "Manual of Gynecology," 5th ed. 1897, p. 52.

organ lies far more commonly to the right of the mid-line of the body than to the left.

Thus *Garrigues*[1] says:

"The fundus uteri lies a little nearer to the right side than to the left";

while *Cunningham*[2] writes:

"The uterus rarely lies exactly in the mesial plane of the body, but usually bends to one or other side, most frequently towards the right";

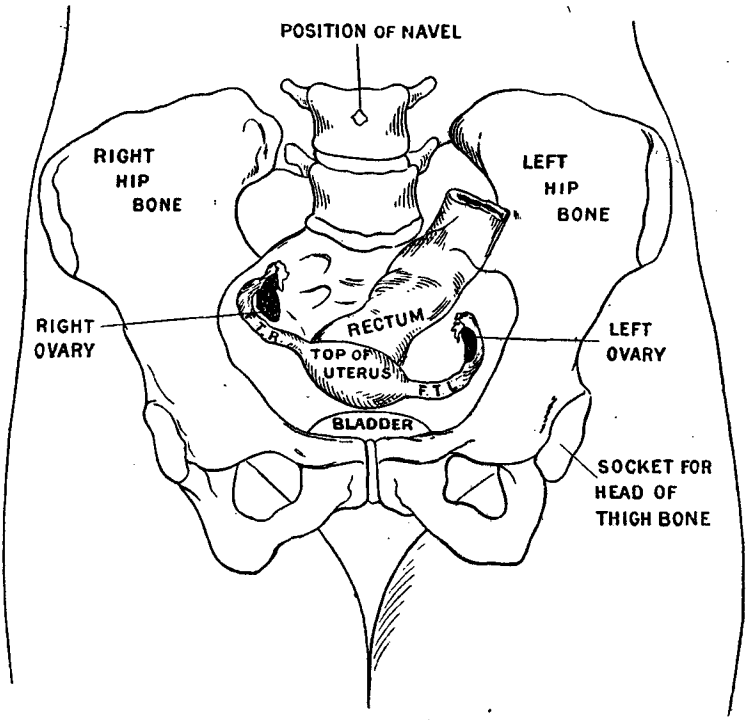


FIG. 3.—THE RELATION BETWEEN THE PELVIS AND THE PELVIC ORGANS AND THE SURFACE OF THE BODY. (Modified from Norris and Dickinson.)

It shows the uterus pushed by the rectum over towards the right side; the right Fallopian tube, F.T.R., is thus carried backwards. The ovaries are shown more or less encircled by their respective tubes; the right ovary is larger than the left.

[1] Garrigues, "Diseases of Women," 3rd ed. 1900, p. 54.
[2] Cunningham, "Text-book of Anatomy," 1903, p. 1132.

and *Gerrish*[1] says:

"As a rule, the uterus does not occupy the median line of the body, but is somewhat deflected, usually to the right. There is also present a certain amount of torsion, by means of which the left superior angle is carried a little farther forward than the right."

The cavity of the body of the uterus, when seen from the front, is triangular in shape, and, like the whole organ, varies in its measurements; thus *Richet*[2] gives the following figures:

	Virgin Uterus.	*Multiparous Uterus.*
Vertical diameter of cavity ..	1·80 in.	2·44 in.
Transverse diameter of cavity	0·60 in.	1·24 in.

The cavity of the cervix is spindle-shaped, with narrowed openings above into the body of the uterus, the internal os, and below into the top of the vagina, the external os, or mouth of the womb.

It should be borne in mind that, though usually described separately, the cavity of the cervix uteri and the cavity of the body are really continuous, and practically form a single cavity only, which should normally in the woman's erect posture, and when seen from the side, show a slight curve, whose concavity looks forwards and downwards.

The cavity of the body of the uterus is lined by mucous membrane, which undergoes monthly growth, and some superficial decay. The glands in this membrane, the uterine glands, secrete a thin secretion which serves to keep the uterine cavity moist.

The walls of the cavity of the uterus, even in a virgin, are not in complete apposition, being always separated by a certain quantity of this mucus, and thus the cavity is always dilatable.

In the event of a woman bearing a child the virgin shape and size of the cavity of the uterus is lost, and is never regained.

Into the cornu, or upper angles of the cavity of the body, the Fallopian tubes open; by its lower opening, the internal os, the uterine cavity communicates *via* the cervix with the vagina or external genital passage.

[1] Gerrish, "Text-book of Anatomy," 2nd ed. 1903, p. 858.
[2] Richet, quoted by Hart and Barbour, *op. cit.*, p. 16.

In various abnormal uteri we find the cavity of the uterus consisting of two parts, and making with the cavity of the cervix a Y-shaped cavity; in other cases the uterus and cervix are completely doubled.

The origin of these malformations is easily explained, as the normal uterus is originally formed by the fusion of two parallel tubes, the so-called Müller's ducts; hence if the septum between them, due to their coalescence, is not

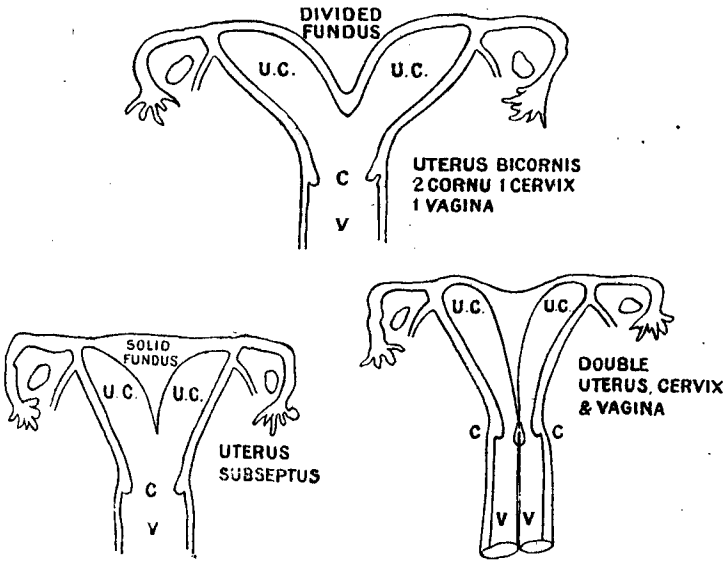


FIG. 4.—VARIOUS ABNORMAL HUMAN UTERI. (Modified from Kehrer.)
U.C. Uterine Cornu and Cavity. C. Cervix of Uterus. V. Vagina.

absorbed, the cavity comes to be divided more or less completely into two.

When the cavity is thus divided above, but coalesced below, and thus opens into a single vagina, as in the uterus bicornis or two-horned uterus, the human uterus closely resembles in form the uterus of the mammalia as a class.

The function of the uterus is to receive the ovum, especially when fertilised, to retain and support it during its growth and development into the fœtus, and then to expel it when able to maintain a separate external existence.

THE FALLOPIAN TUBES.—The Fallopian tubes or oviducts are two in number—a right and a left; they are curving muscular canals, arising one from each side of the fundus of the uterus at its cornu or upper angle. They run outwards laterally from the uterus to the ovaries, and each ends by a fringed and funnel-shaped expanded opening, the abdominal ostium, close to and in immediate proximity to its respective right or left ovary. Each tube is lined internally by mucous membrane covered by special epithelium, which has a wave-like action towards the uterine cavity, due to cilia or fine hair-like processes which project into the lumen of the tube; their movement being always in one direction impels onwards to the uterus any ovum which may enter them.

A small quantity of thin albuminous fluid is secreted by the mucous membrane.

The inner or uterine third of each tube is straighter and thinner than the outer two-thirds, which, increasing gradually in size, curves sickle-like to encircle its corresponding ovary for more than half of its circumference.

The tubes are dilatable; the lumen varies in size, being least where they open into the uterine cavity, and greatest as they approach their expanded, outer, or abdominal opening, near to the ovary.

The average length of each tube is four inches, but they are rarely of equal size or length.

Thus *Hart*[1] says:

"The right Fallopian tube is usually larger than the left,"

while *Montgomery*[2] says:

"The Fallopian tubes vary in size and length, the right tube being the longer."

The tubes have a considerable range of mobility, and are easily displaced by tumour growth or inflammatory affections; the tubes are relatively very much larger, in comparison to the size of the human uterus, than are the Fallopian tubes in most of the mammalia—so much so that the mammalian Fallopian tube is generally overlooked, and the uterine cornu or branches are thought to be the tubes.

[1] Hart, "Atlas of Female Pelvic Anatomy," 1884, p. 12.
[2] Montgomery, "Practical Gynæcology," 1900, p. 132.

The function of the tubes, as their name oviduct implies, is to convey the ovum, fertilised or not, into the uterine cavity. They are practically the excretory ducts of the ovaries, but, unlike most other excretory ducts, they are not part of the gland whose product they transmit, but are portions of the receiving organ.

The contractions of the muscular layers of the tubal wall help in the propulsion of the ovum, and its easy progress is assisted by the thin layer of albuminous fluid moistening the tubal lumen.

THE OVARIES.—The ovaries or genital glands are the essential organs of reproduction; they dominate the entire reproductive life of the woman.

They are two in number, a right and left, and lie on the right and left sides respectively of the uterus. Each ovary is a solid, oval, or almond-shaped organ, and is more or less encircled by the outer or abdominal end of its corresponding Fallopian tube.

The ovaries vary in size considerably in different women, and also at different times in the same woman, according to the condition of their functional activity. Thus each ovary enlarges when about to discharge an ovum, so that *T. G. Stevens*[1] says:

"The ripe Graafian follicle may measure an inch in diameter, and as it projects from the surface its general effect may be to almost double the size of the ovary";

while *Garrigues*[2] says:

"The ovaries, or at least one of them, swell regularly before each menstrual period, and decrease after menstruation";

an ovary also enlarges markedly when, having discharged an ovum which becomes fertilised, a true corpus luteum of pregnancy is formed in the substance of the ovary.

THE TWO OVARIES ARE NOT OF EQUAL SIZE, THE RIGHT BEING LARGER THAN THE LEFT OVARY. *H. Morris*[3] says:

"The right ovary is usually a little larger than the left."

[1] Stevens, "Diseases of Women," 1912, p. 25.
[2] Garrigues, "Diseases of Women," 1900, p. 596.
[3] Henry Morris, "A Treatise on Human Anatomy," 2nd ed. 1898, p. 1052.

An average ovary measures $1\frac{1}{4}$ in. long by $\frac{3}{4}$ in., and $\frac{3}{8}$ in. thick.

Each ovary is attached by its anterior border to the posterior surface of the broad ligament, and to the uterus

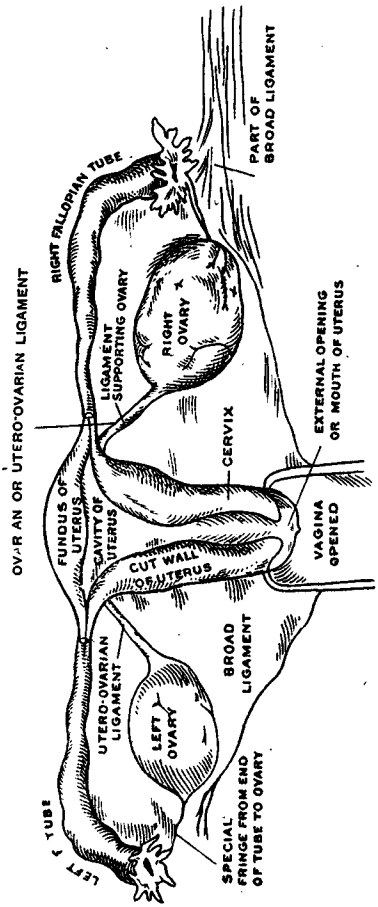


FIG. 5.—POSTERIOR VIEW OF THE OPENED UTERUS, WITH ITS FALLOPIAN TUBES AND OVARIES. (Diagrammatic.)

by a muscular band of varying length, averaging one inch, the ovarian or utero-ovarian ligament; also by an enlarged tubal fringe to the open or abdominal fringed end of the Fallopian tube.

The relative position of the ovaries in the body is much

disturbed by pregnancy, as also by the growth in them or near them of any tumour.

At birth the ovaries are much longer than their width, so that they are described as cucumber-shaped; prior to puberty and ovulation they resemble smooth olives, while in the adult who has ovulated and menstruated for years the ovary becomes scarred and wrinkled, so that it more closely resembles a peach-stone.

The substance of each ovary consists of a groundwork or stroma of fibrous and muscular tissue, in which run numerous blood-vessels and nerves. It is seen to be occupied by a very large number of small vesicles or cysts, called ovisacs or Graafian follicles, after their discoverer *Regnerus de Graaf.*

Each Graafian follicle or ovisac contains an ovum or egg, floating in a little clear albuminous fluid, the Liquor Folliculi.

Authorities differ in their estimates of the number of Graafian follicles contained in the two ovaries at the child's birth. Thus *W. Williams*[1] says:

"Each ovary at birth contains at least one hundred thousand primordial ova,"

while *Piersol*[2] puts them much lower. He says:

"The entire number contained within the two ovaries of the child being estimated at over seventy thousand."

All such figures, however, as *Dr. T. G. Stevens*[3] definitely states,

"must be viewed with some scepticism, because the enumeration of the Graafian follicles in an ovary cannot be a matter of any certainty, and there must be a large margin for errors of observation."

What, however, is certain is, that by far the larger proportion of the Graafian follicles atrophy and disappear, but do not burst, so that by the time of puberty the number of Graafian follicles remaining in the two ovaries, and thus capable of development, is only about one-third of those present at birth.

[1] Whitridge Williams, "Obstetrics," 1903, p. 61.
[2] Piersol, in Norris and Dickinson's "Text-book of Obstetrics," p. 61.
[3] Stevens, "Trans. Obstet. Soc.," vol. xlv., 1903, p. 465. "The Fate of the Ovum and Graafian Follicle in Pre-menstrual Life."

The Graafian follicles are scattered throughout the superficial or greater part of the substance of both ovaries. The

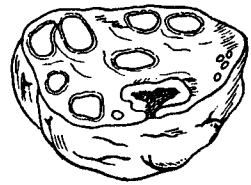


FIG. 6.—SECTION OF AN OVARY FROM A WOMAN ON THE FIRST DAY OF MENSTRUATION, SHOWING BURST FOLLICLE OPENING ON THE SURFACE; OTHER FOLLICLES IN DIFFERENT STAGES OF DEVELOPMENT. (Modified from Leopold.)

deeper part of the ovary contains loose connective tissue and muscle fibres, and transmits the blood-vessels and nerves.

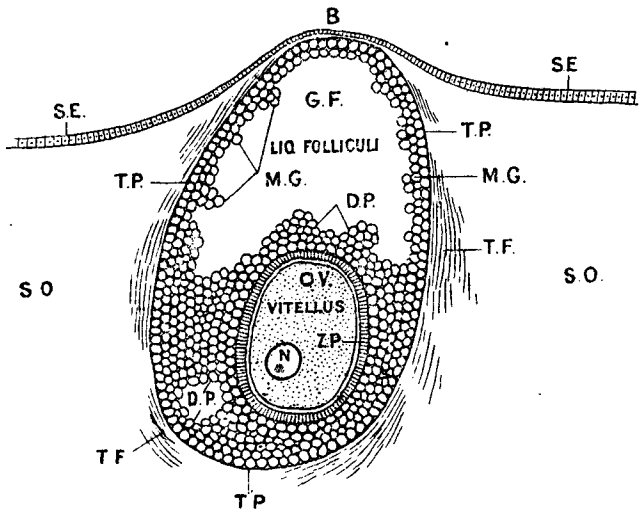


FIG. 7.—DIAGRAM OF A GRAAFIAN FOLLICLE SHORTLY BEFORE ITS RUPTURE. (Much magnified.)

S.E. Surface Epithelium of Ovary, showing at B thinning where the follicle is about to rupture and discharge the Ovum, OV. G.F. The Graafian Follicle, filled with the liquor folliculi, in which is OV., the Ovum, filled by the granular-looking vitellus or yolk; in this lies N., the Ovum Nucleus or germinal vesicle; this contains a nucleolus or germinal spot. S.O. The substance or Stroma of the Ovary. T.F. Condensed ovarian stroma, forming the external wall or Tunica Fibrosa of the follicle. T.P. The Tunica Propria or true wall of the follicle, lined internally by layers of cells, M.G., the Membrana Granulosa, which are heaped around the Ovum to form D.P., the discus proligerus. Z.P. The Zona Pellucida, the outer wall of the Ovum. OV. The Ovum; should be more circular than it is drawn.

Every follicle contains an ovum, now often called an oöcyte, each ovum contains a germinal vesicle or nucleus, and this germinal nucleus contains a germinal spot or nucleolus.

Occasionally the Graafian follicle contains two ova instead of the more usual one (see K, Fig. 8). *Heisler*[1] says:

"As a rule each Graafian follicle or ovisac contains but one ovum, though sometimes two, and more rarely three are present."

Or the single ovum may contain a double nucleus—*i.e.*, two germinal vesicles instead of the more frequent single one (see H, Fig. 8).

[1] Heisler, "Text-book of Embryology," 2nd ed. 1902, p. 27

CHAPTER II

PHYSIOLOGY

OVULATION.—The chief function of the ovaries is ovulation or the discharge of ripe ova, or oöcytes.

This is brought about by the development and maturing of a Graafian follicle, its rupture, and the discharge of the by-now-perfected ovum which it contained. Normally this occurs quite unconsciously and without pain.

The enlarging follicle having gradually approached the ovarian surface, its walls becoming congested, thinned and weakened, and at one part exposed, it then bursts. The liquor folliculi is poured out, and the ripened ovum is set free. This is ovulation or the dehiscence of an ovum.

Heisler[1] says:

"Ova are extruded from the ovary, one or more at a time, at regular, generally monthly, intervals, from puberty to the climacteric, usually during the menstrual period."

Halliburton[2] says:

"The ripening of an ovum occurs about once every four weeks."

In a young girl, before the ovaries have begun to ovulate, *i.e.*, to fulfil their physiological function of providing ova, the surfaces of the ovaries are smooth. *Garrigues*[3] says they are—

"even, smooth, velvety, of pearl-grey colour. Later, each ovulation leaving a little puckered cicatrix, the surface shows irregular depressions."

Dr. T. B. Grimsdale[4] reports a case of a—

"well-developed girl aged 22 who had never menstruated." "Both ovaries presented smooth surfaces like that of an olive. The patient was a virgin."

[1] Heisler, *op. cit.*, pp. 33, 37.
[2] Halliburton, "Physiology," 1915, p. 869.
[3] Garrigues, *op. cit.*, p. 71.
[4] "Journal of Obstetrics and Gynæcology," vol. iii., May, 1903, p. 500.

It must be noted that the greater proportion of the Graafian follicles and their contained ova are microscopic, hence an infinitely small piece of an ovary may contain immature Graafian follicles which are capable of development and maturation. It is only as the growing follicles approach the free surface of the ovary, preparatory to bursting, that they become visible to the naked eye.

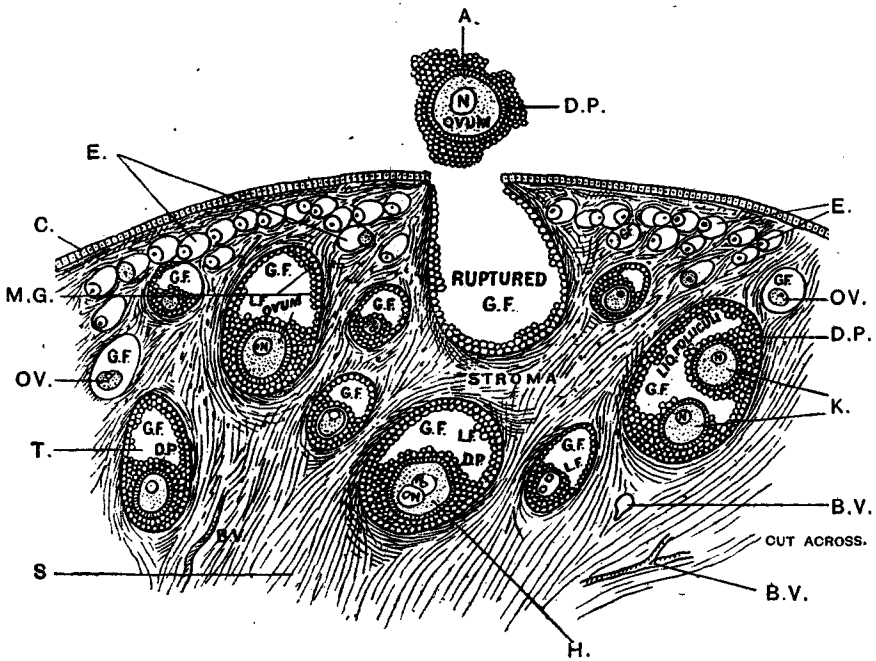


FIG. 8.—COMPOSITE DIAGRAM OF A MAGNIFIED SECTION OF AN OVULATING OVARY.

A. Ripe ovum just shed from the ruptured Graafian Follicle, with cells of the D.P. or Discus Proligerus still clinging to it. G.F. A Graafian Follicle. OV. An Ovum. N. The nucleus of an ovum. L.F. The Liquor Folliculi or liquid contents of a follicle. S. The fibro-muscular stroma or groundwork of the Ovary. B.V. Blood-vessels. E. Small Graafian Follicles near the surface of the Ovary. C. Epithelium covering the free surface of the Ovary. T. Typical G.F. containing the normal single ovum with one nucleus. H. An ovum which has two nuclei. K. Two distinct ova in a G.F.; each is surrounded by cells of the D.P. M.G. Cells lining the walls of the follicles, and known as the Membrana Granulosa.

The Graafian follicle having ruptured and the ovum escaped, the rent in the substance of the ovary then begins to heal and the cavity of the old follicle or ovisac fills up,

being partly obliterated by the collapse and contraction of the sac wall, while the remainder of the cavity is filled with blood incidental to the rupture.

THE CORPUS LUTEUM.—Subsequent changes in the filled-up follicle convert it into a yellow-coloured body called the corpus luteum. The after-history of the corpus luteum is entirely dependent on whether the ovum which was set free from the Graafian follicle becomes fertilised or not.

If *not* fertilised the site of the follicle is gradually obliterated, so that after about two months, only a depressed cicatrix, or pit, shows on the surface of the ovary from whence the ovum was discharged; this smaller corpus

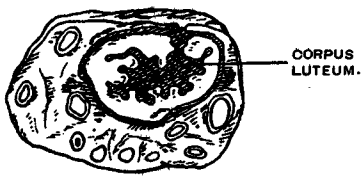


FIG. 9.—VERTICAL SECTION OF A WOMAN'S OVARY A FEW DAYS AFTER A MENSTRUAL PERIOD, SHOWING THE CORPUS LUTEUM, AND SOME GRAAFIAN FOLLICLES. (Modified from Leopold.)

Note their relative sizes, and the folded cell-wall of the corpus luteum.

luteum, which thus follows menstruation only, is known as a *false* corpus luteum or corpus luteum of menstruation.

Playfair[1] says:

"The tissue of the ovary at the site of laceration also shrinks, and this, aided by the contraction of the follicle, gives rise to one of those permanent pits or depressions which mark the surface of the adult ovary."

If the discharged ovum be fertilised we get pregnancy, and the so-called *true* corpus luteum or corpus luteum of pregnancy forms.

This true corpus luteum continues to grow for from three to four months, so that it comes to be a very much enlarged edition of the other or menstrual form of corpus luteum. At the end of pregnancy it is very evident on section of the ovary, while often it may be seen to be present even without opening the ovary. Its entire obliteration, and termination

[1] Playfair, *op. cit.*, p. 67.

as a depressed scar on the ovarian surface, does not take place for two months after delivery. The differences between the corpus luteum after menstruation—*i.e.*, when the ovum was not fertilised—and the corpus luteum when fertilisation has occurred are differences of degree only, as *Piersol*[1] says:

"the stimulus of impregnation leading usually to excessive development."

This is also thus confirmed by *Whitridge Williams*[2]:

"Both the true and the false corpora lutea present exactly the same structure, the larger size of the so-called true corpus luteum being simply due to the increased vascular supply incident to pregnancy."

Without an operation or post-mortem, enabling us to see which ovary contains the corpus luteum, we are quite unable to say from which ovary the ovum was derived; so that, as *Hirst*[3] says:

"The true corpus luteum is of value as an indication of the ovary from which the impregnated ovum came."

We consequently see that a corpus luteum signifies a previous ovulation.

PUBERTY.—Puberty is the epoch in a female's life which marks the change from childhood to womanhood; it is the beginning of her fruitful period. It is a gradual development, and usually takes place from the fourteenth to the fifteenth year of a girl's age.

Spiegelberg[4] says:

"The ovaries and the ova contained in them are the first to arrive at maturity." "The arrival at puberty, however, is generally not coincident with the complete development of all the generative organs, and especially not of the uterus; the latter continues to grow considerably up to the twentieth year."

For the first twelve years of a girl's life the uterus usually retains its infantile condition, but at puberty it rapidly

[1] Piersol in Norris and Dickinson, "Text-book of Obstetrics," 1897, p. 61.
[2] W. Williams, "Obstetrics," 1903, p. 71.
[3] Hirst, "Text-book of Obstetrics," 2nd ed. 1900, p. 63.
[4] Spiegelberg, *op. cit.*, pp. 59 and 62.

begins to increase in size. There are, too, certain external signs of the approach of womanhood, for the breasts become larger and menstruation begins.

As *Bland-Sutton*[1] says:

"In the female puberty is strikingly declared by the institution of menstruation," so that "the actual establishment of puberty is reckoned from the first menstruation."

Further, he says[2]:

"With the onset of puberty the ovaries, previously small, enlarge and exhibit the periodic series of changes known as ovulation."

Hence we get the two processes, ovulation and menstruation, normally starting together at puberty; and being coincident at their beginning, they usually remain so during life. It is not, therefore, until the approach of puberty that the regular full development of the Graafian follicles and their contained ova begins to take place; a few partially develop and then abort, and a very minute proportion may even burst and discharge an ovum before puberty, proof being that girls sometimes get pregnant before they first menstruate; but, as *Piersol*[3] says:

"The advent of puberty marks the establishment of the full and regular development of the Graafian follicles and their contained ova, accompanied by the usual attendant phenomena of menstruation."

Herman[4] says:

"Graafian follicles ripen, though they have not yet been proved to burst, long before menstruation has appeared; and there is reason to think that they may degenerate without bursting before puberty";

and *W. Williams*,[5] while admitting their growth during childhood, says:

"They rarely rupture at this time, on account of their position in the depths of the ovary and the intervention of a thick layer of cortex between them and the surface."

1 Bland-Sutton, "Diseases of Ovaries," 2nd ed. 1896, p. 5.
2 Bland-Sutton and Giles, "Diseases of Women," 4th ed. 1904, p. 17.
3 Piersol, *op. cit.*, p. 71.
4 Herman, "Diseases of Women," 2nd ed. 1903, p. 518.
5 W. Williams, *op. cit.*, p. 66.

T. G. Stevens[1] says:

"No rupture of the follicles takes place, and nothing in the least approaching the structure of a corpus luteum is formed in pre-menstrual life."

So that we see that rupture of the follicles and the formation of corpora lutea do not normally occur prior to the onset of menstruation.

MENSTRUATION.—Menstruation is the expulsion of the menses, a periodic discharge of a bloody fluid containing mucus and débris derived from the superficial cells of the mucous membrane lining the cavity of the uterus. Normally it recurs every twenty-eight days throughout the reproductive period of a woman's life.

It begins at puberty and ceases at the "change of life" or menopause, and on an average it may be taken to extend from the fourteenth to the forty-fifth year of a woman's life, so that the average duration of the menstrual function is about thirty years.

Exceptions to this age-limit at both the beginning and the cessation are frequent, several cases of precocious menstruation, some in infants shortly after birth even, being recorded. These very early cases are open to the objections that bloody vaginal discharge is not necessarily menstruation, and that in most cases it does not recur and so is not periodic, as in the case recorded by *Dr. R. Jardine* in the "British Medical Journal," February 1901; and *Dr. Jellett* is doubtless correct when he says, in "Journal of Obstetrics and Gynæcology," vol. i. 1902, p. 700:

"Menstruation appeared to him to be a misnomer for the red discharge that occurred in newly born female children. It was an isolated hæmorrhage, not a menstrual flow."

Dr. Macnaughton-Jones,[2] however, quotes a case by *Mengus* of regular menstruation in a child 23 months old.

It is commoner to find cases of delayed menopause, some women continuing to menstruate beyond the age of sixty. *Dr. E. J. Tilt*[3] met with two cases at the 61st year out of

[1] *Loc. cit.*, p. 468.
[2] Macnaughton-Jones, "Diseases of Women," 1900, p. 30.
[3] Tilt, "Diseases of Women," 1853, p. 44.

284 patients; while *W. Williams*[1] quotes a case of a woman who had her 22nd child at the age of 63 years, " after which she still continued to menstruate."

It is usually said that menstruation is arrested during pregnancy and during lactation: this arrest is not absolutely certain, for menstruation may continue for the first two or three months of pregnancy. It very rarely, if ever, does so for longer in a *normal* uterus; but for menstruation to take place during lactation is far more common.

Remfry[2] states that among 900 suckling women, in 57 per cent. only was menstruation entirely absent, and that 43 per cent. of suckling women menstruate more or less, 26 per cent. of these menstruating with absolute regularity.

Karl Heil,[3] as a result of his own observations of 200 women, found that 125 of them menstruated during lactation—that is, 62·5 per cent.—and adding his figures to those of other authors, concludes that about one-half of all women menstruate during lactation. Also that as the number of pregnancies increases, the liability to menstruate during lactation increases also.

He considers it probable that the women who menstruate during lactation represent the normal type, rather than those who have amenorrhœa.

Menstruation is the outward periodic sign that the lining or mucous membrane—the endometrium—of the uterine cavity had been prepared to receive and give anchorage to a fertilised ovum; hence *Geddes* and *Thomson*[4] say that " menstruation is comparable to an abortion prior to a new ovulation "; but as the stimulus imparted by a fertilised ovum is not forthcoming, its degeneration and discharge accompanied by some bleeding follow.

Menstruation is therefore, as *Dr. John Power* in 1821 wrote of it, a " disappointed pregnancy "; or, as *Dr. Robert Cory*[5] calls it, " only the abortion of an unimpregnated ovum

[1] W. Williams, *op. cit.*, p. 74.
[2] Remfry, " Trans. Obstet. Soc.," vol. xxxviii. 1896, p. 26.
[3] " Monat. für Geb. und Gyn."
[4] Geddes and Thomson, " The Evolution of Sex," 1901, p. 265.
[5] Dr. R. Cory, " Lancet," November 7, 1891.

or egg"; while *Dr. Peter Horrocks*[1] terms it a "miniature parturition."

Dr. A. W. Addinsell[2] says:

"Menstruation may be considered as evidence of a failure of these anticipations"—"for the implantation of an impregnated ovum."

The process of building up a fresh nidus of swollen mucous membrane, to prepare for an oösperm or fertilised ovum, recurs after each discharge of the preceding unused one; the degeneration and discharge of some of the hypertrophied mucous membrane is the result of disappointment in the absence of an oösperm. This constitutes menstruation; and the process is made evident to the woman by a varying amount of pain and constitutional disturbance, and clinically by variations in temperature, pulse, blood pressure, etc.

These, then, are the phenomena of menstruation, and have nothing whatever to do with its causation.

Some few authorities, as *Heape* and *F. H. Marshall*, are disposed to call menstruation a preparation *for* pregnancy, not an undoing of the preparations: which is correct is immaterial to this theory of sex causation, but certainly, if this is so, pregnancy in a non-menstruating woman, *i.e.* in a woman whose uterus was *not prepared for* pregnancy, would be very difficult to explain.

Proof that the presence of menstruation is not necessary in order that impregnation should occur is shown by the cases of pregnancy beginning during long periods of amenorrhœa; thus—

Strassmann[3] recorded a remarkable case of absence of menstrual periods and repeated pregnancies. A woman of 45 began to menstruate at 16 years of age, and continued regularly up to her 18th year, when she had her first child. From the 18th to the 39th year she did not menstruate at all, but had seventeen full-time pregnancies and a three-months' miscarriage. At the age of 39 menstruation returned and continued regularly monthly until she was 45.

So that for over twenty years her uterus was *not prepared*

[1] Horrocks, "Trans. Obstet. Soc.," vol. xl. 1898, p. 173.
[2] Dr. A. W. Addinsell, "Lancet," March, 1905, p. 791.
[3] "Lancet," July, 1905, p. 171.

by menstruating *for* pregnancy ! yet she became pregnant ! and gave birth to seventeen children.

A somewhat similar case occurred in my own practice:

Mrs. W. A. T. was aged 38 in September 1911. Her menstrual periods began when she was between 16 and 17 years of age, irregularly at first and always rather scanty.

She had three children in the first three years of her married life. After that her periods only occurred at very long intervals, never less than a year apart.

In September 1911, being then pregnant some three months, she engaged me to attend her in her confinement. She had then just gone two years and six months since her last period, and a similar interval had elapsed between that one and its predecessor, *i.e.* two periods in five years—she had only seen five periods altogether in the nine years preceding. I delivered her on March 15, 1912, of triplets—two girls and a boy; and eighteen months afterwards I heard she had twin boys.

As in both these cases menstruation was absent many, many months prior to conception, it looks as though the contention that menstruation is a preparation *for* pregnancy cannot be maintained—for presumably the uterus must be "prepared for pregnancy" or pregnancy could not take place, and in both these cases no such preparation had taken place, yet pregnancy occurred.

Unlike *Marshall* and *Heape*, *Dr. T. G. Stevens*[1] says:

"Menstruation is much more likely to represent the *failure* of the uterus to receive a fertilised ovum."

The actual cause of menstruation is unknown: it has been ascribed to nerve influence, and is thought to be probably controlled by an undiscovered nerve centre in the brain; and a sympathetic nerve ganglion in the ovary has even been described. True menstruation occurs only in women and a few (especially captive) monkeys; and has therefore been attributed to their erect postures, in most mammals the amount of blood not being sufficient to envermeil the discharge.

It may roughly be said that, normally, previous to the

[1] Dr. T. G. Stevens, "Diseases of Women," p. 64, 1912.

onset of menstruation and after its cessation (the menopause), women are incapable of bearing offspring or becoming pregnant. This rule, however, like most others, meets with a few unimportant exceptions. Thus *Dr. Addinsell*[1] relates a case of pregnancy in a girl of 13 prior to any appearance of menstruation; while of the rarer condition of pregnancy after the menopause, the following is a case from my own private practice: Early in March 1904 I attended Miss E. C., aged 50. She had passed "the change," and had seen nothing for just two years. Meeting her former lover once again after many years' absence, and, deeming herself safe from the possibility of pregnancy, she ran the risk, and was duly delivered by me of a living healthy male illegitimate child, nearly three years after having ceased to menstruate. Menstruation did not reappear.

A somewhat similar case is recorded by *Dr. R. Hann*[2] in a woman of 49 years, who gave birth to her thirteenth child—a boy—three years after the menopause; but in this case menstruation returned after weaning this child.

All authorities agree that, prior to puberty, the ovaries of a girl present smooth surfaces; then, as *Bland-Sutton*[3] says, "from puberty to the menopause the smoothness of the surface is marred by scars, caused by the rupture of mature follicles"—that is, by ovulation. So that prior to puberty, "strikingly declared by the institution of menstruation" (*Bland-Sutton*), ovulation has not occurred to scar the smooth surface of the ovaries.

The two processes, ovulation and menstruation, evidently both depend upon a common cause, possibly a periodical congestion induced and controlled by a nerve impulse; having the same cause, they usually occur about the same time—*i.e.* they are nearly if not quite synchronous.

Heisler[4] says "the two processes (ovulation and menstruation) usually occur at the same time"; so that *Temesvary*[5]

[1] "Lancet," March 25, 1905, p. 791.

[2] R. G. Hann, "Journal of Obstetrics and Gynæcology," September 1902, p. 290.

[3] Bland-Sutton, "Diseases of Ovaries," 1896, p. 26.

[4] Heisler, "Text-book of Embryology," 3rd ed. 1907, p. 38.

[5] Temesvary, "Journal of Obstetrics and Gynæcology of the British Empire," vol. iii. 1903, p. 512.

calls menstruation "the outer sign of ovulation." *Heisler*[1] also says "the ovum is usually discharged from the ovary during the menstrual period."

That ovulation can occur without menstruation is evident from those rare cases where young girls become pregnant before menstruation has begun.

This is chiefly due to the fact that the ovaries and their contained ova are fully developed earlier than the uterus (see remarks of Spiegelberg, p. 20 *ante*), so that a mature ovum may be formed some time before the uterus has developed sufficiently to menstruate. The fertilisation of the ovum and its consequent attachment to the wall of the immature uterus cause the rapid and complete development of the uterus, so that the pregnancy continues and the child is born before its mother has even menstruated; but the pregnancy will have caused the full development of that uterus.

Ovulation must occur without menstruation in those cases where women get pregnant during lactation, when menstruation is often absent.

There are many reasons for believing that usually ovulation continues with its habitual regularity throughout the lactation period, the process of lactation replacing that of menstruation; but for pregnancy to occur before the reappearance of the menses is not usual, *Remfry*[2] giving only 6 per cent. as the number of non-menstruating women who conceive during lactation, while 60 per cent. of women get pregnant who menstruate during lactation.

The obvious criticism of both the above cases of ovulation without menstruation is that, though both occasionally occur, yet both are uncommon and more or less exceptional; in both cases fertilisation does not usually occur till after the appearance or reappearance of menstruation.

That ovulation may occur and menstruation be absent is most evident from cases where, though the ovaries are present, the uterus is either entirely absent or so rudimentary as to be functionless. Ovulation in this case cannot be accompanied by its usual phenomenon of menstruation; but we must not argue from congenital abnormalities.

[1] Heisler, *op. cit.*, p. 41. [2] Remfry, *loc. cit.*

That ovulation usually occurs only at or about the time of a menstrual period, the previously mentioned exceptions notwithstanding, is evident from the following facts.

After the discharge of an ovum a corpus luteum is formed; a corpus luteum, therefore, as we have already seen, signifies a previous ovulation. The only ultimate trace of a corpus luteum is a scar or cicatrix on the surface of the ovary.

If, therefore, ovulation occurred oftener than at or about the time of a menstrual period, the signs of the previous ovulations, viz. scars of corpora lutea, would be increased in number, and would not correspond to the number of menstrual periods experienced, as they practically invariably do.

If ova were habitually discharged independently of menstruation—say one or two ova every week, and by each ovary—then at the end of a lunar month of four weeks we ought to find post-mortem from eight to sixteen corpora lutea in the two ovaries for each month or menstrual period, which is absurd.[1]

W. Williams[2] says:

"We must conclude that ovulation and menstruation usually occur about the same time, but that one not infrequently antedates the other by a few days."

The fact should be pointed out that, *if a girl have menstruated only three times in her life, only three ovulation scars*

[1] The statements made by some operators that during abdominal operations Graafian follicles have been seen either "just ruptured, or about to rupture, at all periods of time between two menstrual periods" are fallacious if implying that this is a normal condition of things.

These cases are open to the criticism that operative cases are manifestly not normal; then, too, the excitement incident to an approaching abdominal operation, especially one on the sexual organs, is quite sufficient to induce that extra activity, or undue congestion, which will cause a ripening Graafian follicle to prematurely rupture.

It is notorious that the menstrual period is often thus expedited.

While as to those follicles thought to be "about to rupture" we have no evidence and no data on which to form an opinion of the imminence of rupture of a follicle, so that the time of rupture of a follicle, deemed "about to rupture," may well be a full week or more distant. It is an assumption to allege that *any* follicle is "about to rupture" if its rupture within a few hours is thereby meant.

Numerical agreement of the number of scars of corpora lutea *seen* with the known number of menstrual periods *experienced* undoubtedly show the normality of their synchrony.

[2] Williams, *op. cit.*, p. 77.

will be found in her two ovaries. If ovulation usually occurred, say weekly, that girl, having seen three monthly or menstrual periods, should have exhibited in her two ovaries not three cicatrices only, but from twelve to twenty-four at least, that is, one each week from each ovary; so that these *scars* or *signs of ovulation equal the number of menstrual periods experienced.*

Strassmann, quoted by *Dr. Macnaughton-Jones*,[1] says:

> "Anatomical examinations on the number of corpora lutea, contrasted with the number of known menstruations, establish the connection between ovulation and menstruation"; and "Each menstruation is the expression of an ovulation."

Whether the two processes strictly agree as to time is immaterial; in fact, ovulation probably usually precedes menstruation by a day or two. Ovulation is certainly usually a painless and spontaneous process, which we are quite unable to induce, though sexual excitement probably helps to do so.

Ovulation is the function of the ovaries, the period of functional activity of the ovaries is coincident with the woman's menstrual life; so that both ovulation and menstruation occur only during the period of a woman's potential fertility.

That menstruation and ovulation are dependent on a common cause is evident from the facts that—

What stops ovulation also stops menstruation: in the complete congenital absence of the ovaries, though the uterus be present, menstruation does not occur.

When the ovaries atrophy in old age, menstruation stops.

When, as is normal prior to puberty, the ovaries are not active and ovulating, menstruation does not occur, so that when ovulation begins menstruation also usually begins.

Alban Doran[2] has pointed out that among the Esquimaux, during the Arctic winter, breeding is arrested, and is accompanied by cessation of menstruation during that time also; so that the *cold which stops ovulation also stops menstruation.*

[1] Macnaughton-Jones, "Diseases of Women," 8th ed. 1900, p. 34.
[2] Alban Doran, "Trans. Obstet. Soc.," vol. xl. 1898, p. 166.

Dr. E. J. Tilt[1] mentions that the surgeon to Sir John Ross' Arctic expedition reported that the Esquimaux women only menstruate during the summer months.

Because instances have occurred where menstruation (?) has recently happened, and no trace of the ripening of an ovum has apparently been found, it has been alleged that menstruation can occur without ovulation. This statement must be accepted with great reserve. All hæmorrhages in women are not menstruation, and we require to exclude several conditions and morbid growths as causes, before deciding that the hæmorrhage was a true menstrual period. We should not forget that the hæmorrhage from bleeding piles *has* been taken for menstruation!

Then, too, failure to find what is deemed a recently ruptured Graafian follicle is no proof that ovulation did not occur, and it is probable that in young women a corpus luteum of menstruation often disappears more rapidly than we usually expect, and thus resembles a corpus luteum of a former ovulation, and so is not ascribed to the recent menstruation.

Confirmatory of this, *W. Williams*[2] says:

"In young women, in whom the circulation is active, the degenerated lutein cells are rapidly absorbed, so that in a short time the corpus luteum becomes replaced by newly formed connective tissue which corresponds closely in appearance to the surrounding ovarian stroma."

Some other cases may be explained thus; *Leopold*,[3] quoted by Heisler, says:

"If rupture (of a Graafian follicle and extrusion of the ovum) occurs during the intermenstrual period instead of at the time of menstruation, hæmorrhage will be small or entirely wanting, the resulting corpus luteum being called then *atypical*, to distinguish it from the *typical* body formed in the ordinary manner."

Again, hæmorrhage, after the menopause or change of life, often erroneously taken for menstruation, is necessarily unaccompanied by the formation of a corpus luteum in either ovary.

[1] Dr. E. J. Tilt, "Diseases of Women," 1853, p. 112.
[2] Williams, *op. cit.*, p. 68.
[3] Heisler, *op. cit.*, p. 33.

We are forced, then, to agree with *Horrocks*[1] when he says:

"There are no facts which proved that menstruation could take place without ovulation."

As a matter of fact, menstruation cannot occur if all ovarian tissue is absent; it is absolutely dependent on the presence of some ovarian tissue.

[1] Horrocks, "Trans. Obstet. Soc.," vol. xl. 1898, p. 173.

CHAPTER III

THE FORMATION OF OVA

In the human embryo the surface of each ovary is covered by a thick layer of oblong or columnar cells—the germinal epithelium. From this germinal epithelium all the ova are eventually developed.

Downgrowths of the covering cells or germinal epithelium take place into the substance of the ovary, and from these cells thus carried into the stroma of the gland the Graafian follicles are formed, one or more cells being specially enlarged to form the contained ovum or ova.

These ingrowths of the germinal epithelium take place during intra-uterine life, so that at birth the child's ovaries already contain, though in an immature form, the full number of ova that the adult ovaries contain. The formation of new ova ceases with the birth of the child.

It will thus be seen that all the ova shed during a woman's life are highly matured cells, whose development has been slowly taking place prior even to the woman's own birth.

The ova are not the result of hurried growth, but of careful and very deliberate preparation extending over many years.

No new Graafian follicles are formed after birth, but as the two ovaries together are estimated at puberty to contain some 70,000 Graafian follicles it is evident that only a very few ever reach maturity. The majority of the follicles never ripen, or, if they do, they do not burst—they atrophy and disappear.

Halliburton[1] says:

"Some of the Graafian follicles never burst; they attain a certain degree of maturity, then atrophy and disappear."

The human ovum, oöcyte, or sexual cell is a spherical particle of viscous protoplasm of a complicated chemical

[1] Halliburton, "Handbook of Physiology," 5th ed. 1903, p. 801.

composition, varying from $\frac{1}{120}$ to $\frac{1}{150}$ in. in diameter; it is a single living cell, capable of further growth and great development if fertilised.

It soon dies after its discharge from the Graafian follicle if not fertilised, its life being counted by days only—thus differing considerably from the male sexual cell, or spermatozoon, which can live for weeks even, in the Fallopian tube of a woman.

Though our microscopes are not perfect enough to enable us to detect any differences between them, *each ovum has, I maintain, its own definite and unalterable sex,* being either male or female, according to the ovary from which it is derived.

And in the same way, the ovum of one woman is indistinguishable by microscope or any apparatus from the ovum of another woman, yet we know there *must* be vast differences between them; similarly the ovum of a negress is indistinguishable by our present appliances from the ovum of a blonde, yet we know full well that if fertilised the one produces a dark child, while the other gives rise to a white one.

The difference must be there, but we cannot detect it; it may be chemical and not discernible microscopically.

And in animals, just as surely as a cat's ovum, indistinguishable by microscope or other apparatus from that of a bitch, will give rise to a cat and not a dog, so a male human ovum, though we cannot yet by any of our present means distinguish it from a female one, will as surely give rise to a boy and not a girl, and *vice versa* the female ovum gives rise to a girl and not a boy.

In structure an ovum is a typical cell, or circular mass of protoplasm with a very fine and delicate cell wall or limiting membrane, called the Vitelline membrane (see Fig. 10). External to this, but separated from it by a little fluid (the Perivitelline fluid), is a second protective cell wall, the Zona pellucida or Zona striata.

The perivitelline fluid, therefore, occupies the perivitelline space between the true and the secondary cell walls.

The zona pellucida (1, Fig. 10) exhibits hundreds of fine lines or striæ—hence also zona striata—radiating outwards; these fine hair-like lines are really pores or canals,

so that this cell wall is a porous one. Through these canals the ovum is nourished, and through these " avenues of entrance " the mov ng spermatozoa enter the ovum and so reach the nucleus; they are really multiple " ways in " for the spermatozoa.

In this respect the human ovum differs from those of the invertebrata, which have only one such opening or " way in " for the spermatozoa, called the micropyle; but, as we shall presently see, only one spermatozoon is required to

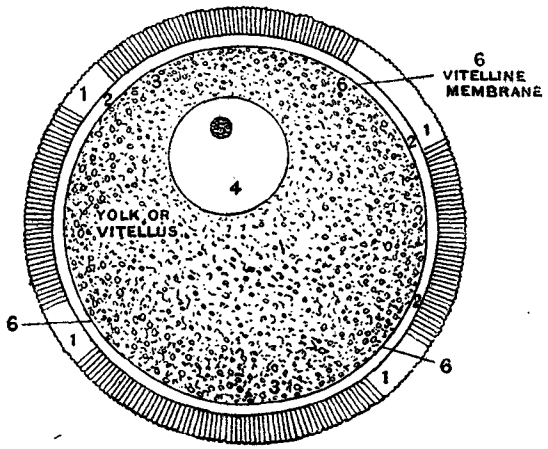


FIG. 10.—DIAGRAM OF A HUMAN OVUM. (Much magnified.)

Though this diagram represents the ovum as quite flat, it must be remembered it is a sphere, and more nearly resembles a miniature orange than a vertical section of an orange as the figure would appear to indicate. Compare Fig. 12.

1. Zona Pellucida, the thick cell wall, showing radiating lines, which are pores or entrances for the spermatozoa. 2. Perivitelline space, containing the Perivitelline fluid. 3. The ovum filled by the Yolk, or protoplasm loaded with food granules. 4. The nucleus or Germinal vesicle. 5. The nucleolus or Germinal spot. 6. Vitelline membrane or delicate ovum wall.

enter the ovum of the invertebrata in order to fertilise it, so that " the supply is equal to the demand."

The contents, yolk, or vitellus of the cell is protoplasm, and situated eccentrically therein lies the spherical nucleus, $\frac{1}{100}$ in. in diameter, called the germinal vesicle, and this contains a nucleolus known as the germinal spot. *The nucleus or germinal vesicle is the most important part of the whole ovum;* it is usually single, but there may be two nuclei. It is junction with the nucleus of the ovum by the

head or nucleus of the spermatozoon that constitutes fertilisation. We know nothing of the use or function of the nucleolus.

To the protoplasmic vitellus or germ yolk of the ovum is added material called deutoplasm or food yolk, designed for the nutrition of the ovum during the first few days of its development after fertilisation.

The germ yolk is always in great excess compared to the food yolk in a human ovum.

All ova in which the protoplasm, or germ yolk, and the deutoplasm, or food yolk, are uniformly distributed, as in those of the mammalia, including man, are known as Alecithal ova.

The eggs of birds, reptiles, and bony fishes are known as Telolecithal ova; for the preponderating food yolk is accumulated at one part of the ovum, and the protoplasmic germ disk at, usually, the opposite pole.

NOTE.—Some of the statements as to the very minute structure of cells and their nuclei must be accepted with some reserve, for in the staining and preparation of the cells we cannot be quite sure that we have not ourselves caused the appearances so described, so that the facts may be really artificial ones, or *artifacts*, as they often are called. Hence I shall not detail them, as they do not now concern us.

CHAPTER IV

THE FORMATION OF THE SPERMATOZOA

THE spermatozoa are the essential fertilising constituents of the semen; they float in an albuminous fluid, the liquor seminis.

Each spermatozoon consists of a head $\frac{1}{6000}$ in. long, and a long slender tail from $\frac{1}{400}$ to $\frac{1}{500}$ in. long; a middle portion or body, thicker than the tail, is also described. They therefore slightly resemble miniature tadpoles.

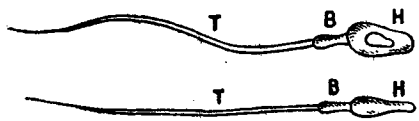


FIG. 11.—HUMAN SPERMATOZOA. (Highly magnified.)

H. The head, showing a nucleus. B. The body or middle piece. T. Long tail, the source of the motility of the spermatozoon.

The spermatozoa are derived from the spermatoblasts or cells, which form the most internal lining of the seminiferous tubes or seminal canals of the testes. The nucleus of the cell forms the head of the spermatozoon.

The long tail projects into the lumen of the seminal tube, and when fully developed the spermatozoon is set free, and is probably carried to the vesiculæ seminales or receptacles for the storage of the semen.

No spermatozoa are formed till after puberty, usually about the fifteenth or sixteenth year; any seminal fluid in younger boys usually containing no spermatozoa.

Under certain conditions in man the formation of spermatozoa is very rapid, but in no case is their preparation such a long and careful process as is that of an ovum.

It has already been pointed out that the ova are all formed before the child's birth even, the spermatozoa not till

puberty, hence the ovum is a far more slowly matured and specialised cell than the spermatozoon. In size, too, the ovum is much the larger and more important. The diameter of the ovum is forty times greater than the length of the spermatozoon's head, while the nucleus or essential portion of the ovum is $\frac{1}{700}$ in. in diameter; the head of the spermatozoon, containing the nucleus or essential portion, is only $\frac{1}{6000}$ in. long; in fact, the spermatozoa are the smallest cells in the body.

The spermatozoon and ovum agree in that each is a small mass of protoplasm containing a nucleus; the former represents a portion of the father's body, the latter a portion of the mother's body.

The long tail of the spermatozoon is essential to its motility or power of progression, and for the most part disappears after the spermatozoon has entered the ovum—that is, when, having reached its goal, it is no longer required.

CHAPTER V

FERTILISATION

FERTILISATION is the incorporation of the essential portion of the male fertilising fluid, or semen, with the ovum or egg provided by the female.

The ovum before, and after, fertilisation are two vastly different things: the unfertilised cell becomes an oösperm, zygote, or fertilised cell, which differs from the original ovum not only in its chemical composition, but also in its power of life and growth. A portion of the male parent's body has by means of the spermatozoon joined the ovum or part of the mother's body, and the germ of a new being begins to grow.

The youngest fertilised human ovum or oösperm ever found and described was believed to be the one by Hubert Peters, in 1897, in the uterus of a woman who committed suicide three days after missing her menstrual period; therefore it was at first claimed, on not very conclusive grounds, to be of only three days' development: but we do not know when the fruitful coitus took place—it may have been two or three days or even a week or more previous to the day her period was expected to begin, hence five to fifteen days would then represent its age. Though considered to be only three days old by Peters, the ovum, *W. Williams*[1] says, "certainly presents a tolerably advanced stage of development."

A still younger oösperm has since been described by *Drs. Bryce* and *Teacher*, who claim it to be about thirteen to fourteen days old, while they judge Peter's fertilised ovum to have been *at least* fourteen to fifteen days old.

Graf Spee has described two very early fertilised human ova, but both were slightly older than that of Peters.

[1] Whitridge Williams's "Obstetrics," p. 88.

The youngest I have personally met with was certainly less than fourteen days old.

If, therefore, the youngest oösperm ever seen was at least thirteen days old, it follows that the *actual fertilisation of the human ovum has never been observed*, hence the minute processes and early phenomena incidental to the fertilisation of the human ovum *are quite unknown*, as *Dr. J. W. Ballantyne*[1] says:

"No biologist and no embryologist has ever seen the human ovum entered by the human spermatozoon."

Dr. Eden[2] rightly says: "The details of the process of fertilisation naturally cannot be studied in the human species"; so that the descriptions given in many books as entirely applicable to man are but assumptions, based on observations made chiefly on the invertebrata, the round-worm of the horse especially.

Indeed, *very few if any men have even seen a free human ovum*, that is, one discharged naturally from its Graafian follicle, and most observations have been made on ova *artificially* removed from the follicles either after death or while operating under chloroform, etc.

We are equally ignorant with regard to most animals, and *Dr. Eden*[3] tells us:

"The beginnings of development have not yet been made out with precision in *any* of the mammalia."

The actual contact of the spermatozoon with the nucleus of the ovum not having been observed, it is impossible to say how many human spermatozoa are required to fertilise the human ovum.

From analogy it has been believed and dogmatically taught that only one spermatozoon was necessary: this may be so, but it is also open to doubt. One spermatozoon only *may* be sufficient, but it is also quite possible that very often, if not usually, many spermatozoa participate. And here it is advisable to recall *Dr. J. W. Ballantyne's*[4] warning that

[1] Ballantyne, "Manual of Antenatal Pathology," p. 608.
[2] Dr. T. W. Eden, "Manual of Midwifery," 4th ed. 1915, p. 10.
[3] Eden in Playfair's "Midwifery," 1898, p. 88.
[4] Ballantyne, *op. cit.*, p. 24.

"it is not safe to conclude that what occurs in the lower animals will occur in the human subject."

Fertilisation of the frog's egg and also of the transparent ova of several of the invertebrates, *e.g.* thread-worms and sea-urchins, has been actually watched. In them only one spermatozoon has been seen to enter the ovum, through the only opening, called the micropyle, in the tunic or wall of the ovum; hence it has been assumed that only one likewise enters the human ovum. Though the entrance of but one spermatozoon is usual, according to among others Van Beneden, he has actually, though on but few occasions, seen

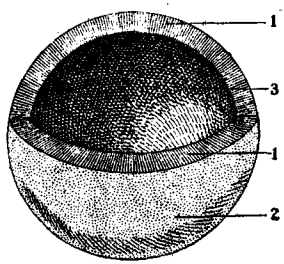


FIG. 12.—MAGNIFIED VIEW OF A HUMAN OVUM REMOVED FROM A GRAAFIAN FOLLICLE. (Diagrammatic.)

The spherical ovum has been cut vertically and horizontally, to show that the cell-wall is universally perforated by the porous canals for the entrance of the spermatozoa. The outer surface of the ovum, 2, shows the minute puncta or orifices of the canals, which are shown in 1 as radiating lines; 3 shows the interior of the ovum from which the nucleus and the liquid yolk have escaped.

two spermatozoa enter one ovum, while watching the fertilisation of the eggs of the ascaris.

Comparative embryology is at best a doubtful guide, and that it is dangerous to argue from analogy is evident from the fact that there are marked differences in the ova of the mammalia, including the human ovum, and the ova of the fishes, birds, or reptiles, the ova of the latter being meroblastic and telolecithal, while the human ovum is holoblastic and alecithal.

A *meroblastic* ovum means that a portion only of the ovum when fertilised divides or segments, and it contains more food yolk than germ yolk, as it has to develop independently of the mother; while in the *holoblastic* ovum the whole

substance divides and subdivides, it contains much more germ yolk than food yolk, because the mammalian embryo very early derives its food supply from the mother while in utero.

It is possible that this initial fundamental difference in the ova is sufficient to require the different number of spermatozoa, more being required when the whole ovum segments as does the human ovum.

There is no micropyle, or specialised " way in," provided in the cell wall of the human ovum for the entrance of the spermatozoa; on the other hand there are multiple openings,

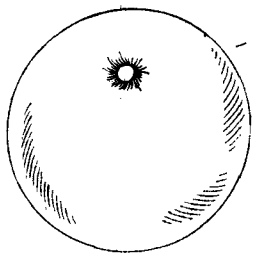


FIG. 13.—MAGNIFIED VIEW OF THE OVUM OF AN INVERTEBRATE.

The spherical ovum presents one large opening, the micropyle, " the only way," for the spermatozoon.

actually many thousands, in the human ovum wall, so it is only reasonable to suppose that at least hundreds, if not thousands, of spermatozoa *do* enter the ovum by them and so reach the protoplasm or yolk of the ovum, whence it is possible that several also enter the nucleus of the ovum.

That the striæ in the zona pellucida are for the passage of the spermatozoa is stated by *Gerrish*,[1] who says:

" The zona pellucida is marked by numerous radiating striæ. The striæ are supposed to be minute canals, through which nutrition reaches the ovum while it is still in the Graafian follicle, and through which the spermatozoa may afterwards pass in the process of fecundation."

Cunningham[2] too says " they allow the spermatozoa to reach the ovicell."

[1] Gerrish, " Text-book of Anatomy," 2nd ed. 1903, p. 852.
[2] Cunningham, *op. cit.*, p. 12.

Heisler[1] also confirms this, and points out that these canals

"*correspond in function to the micropyle*, a small aperture found in the less easily penetrable egg envelopes of many invertebrates, and of some fishes."

In the invertebrata, therefore, the supply is equal to the demand—viz. one micropyle for one spermatozoon. Hence, in those cases where there is only the single micropyle or special "way in" provided in the ovum wall, we should expect that one spermatozoon enters thereby only, because only one spermatozoon is needed. Certainly the provision in the human ovum of multiple avenues of entrance looks as though multiple spermatozoa *are* required to enter thereby, in order to fertilise the human ovum; or does the supply far exceed the demand—thousands of ways in for only one spermatozoon! It would be more rational to expect hundreds of spermatozoa for every "way in"; which there probably are, as the total number of spermatozoa in a single seminal ejaculation has been estimated at several millions.

It is certainly evident, as stated by *Dr. J. W. Ballantyne*,[2] that "what took place in the chick did not necessarily occur in the human embryo"; and even more truly what takes place in the ova of worms and sea-urchins need not occur in the human oösperm. Indeed, *Dr. J. Teacher*[3] says that "each ovum seems to be a law unto itself."

Nature would hardly be so prolific in her supply of human spermatozoa to the single ovum if one only were necessary; for certainly the *enormous* number of spermatozoa provided each time, and *their very frequent renewal*, and their long life in the Fallopian tubes, point rather to the necessity of multiple spermatozoa.

Nature may well require only a single spermatozoon for each ovum in those cases where sexual congress and fertilisation are an annual, or at most a half-yearly occurrence, and

[1] Heisler, *op. cit.*, p. 23.
[2] Ballantyne, "Journal of Obstetrics and Gynæcology," 1902, vol. i., p. 698.
[3] Dr. J. Teacher, "Journal of Obstetrics and Gynæcology," July, 1903, vol. iv. p. 25.

the ova to be fertilised are numbered by thousands or even hundreds of thousands.

Polyspermy, or the entrance of multiple spermatozoa into the ovum nucleus, has been blamed for the production of human deformities on no reliable evidence; for who sees the fertilisation of the ovum when a monstrosity is produced? It has also been blamed for the production of twins and plural births on equally inaccurate data, for we know that usually when these occur multiple ova, as evidenced by multiple corpora lutea, have been produced.

NORMAL SITE OF FERTILISATION.—There is every reason to believe that fertilisation usually takes place in the Fallopian tube, and not in the uterus; if the uterus were the proper site for fertilisation, then tubal pregnancies should not occur so frequently.

The discovery in utero of an early fertilised ovum is no proof that that ovum was not already fertilised when it first reached the uterus; on the other hand, tubal pregnancies are so numerous that they must be looked upon as cases of abnormal arrest of a normally fertilised ovum in its progress along the tube, and not as cases of abnormal fertilisation in an abnormal site.

We are forced, then, to the conclusion that the actual site where fertilisation normally takes place is the Fallopian tube; probably it occasionally occurs in the body of the uterus, as it undoubtedly also does, on very rare occasions, in the recently ruptured Graafian follicle on the surface of the ovary; hence the site of fertilisation is not identical in all cases.

Garrigues[1] says:

"The Fallopian tubes are the canals through which the ova pass from the ovaries to the uterus, and in which probably, in most cases, impregnation takes place by the union of an ovum and one *or more* spermatozoids."

Halliburton[2] says:

"The spermatozoa make their way into the Fallopian tubes. It is here that they meet the mature ovum."

[1] Garrigues, "Diseases of Women," 3rd ed. 1900, p. 68.
[2] Halliburton, *op. cit.*, p. 881, 1915.

So usual is it for spermatozoa to be found waiting for the ovum in the Fallopian tubes of women in whom sexual congress regularly occurs, that the Fallopian tubes are now regarded as receptacles for the semen.

Most often, then, the fertilisation of the ovum and its conversion into an oösperm takes place in the Fallopian tubes, both in women and the mammalia; it then safely makes the journey down the Fallopian tube to the uterus, which is, in fact, the incubator or nest for the fertilised egg.

On its arrival there, it finds a bed, or nidus, in the shape of a thick vascular mucous membrane, into which the ovum sinks, and thus secures a safe resting-place.

The site where it anchors or embeds itself is usually either the anterior or posterior wall of the uterus, but may be at any part of the uterine wall, even low down near the cervix, as in cases of placenta prævia. To whatever part it attaches itself, the now living and growing ovum practically eats or bores its way into the substance of the congested mucous membrane, and the result of the activity displayed by the growth and the fixation of the oösperm is that the mucous membrane does not degenerate and wither, but maintains its integrity and position, and thus menstruation is arrested: the woman is pregnant.

If the ovum set free be not fertilised, menstruation occurs —that is, hæmorrhage occurs from the congested superficial vessels, and portions of the epithelial lining of the congested uterine mucous membrane degenerate and are shed.

The site of attachment of the oösperm, the future placental site, is usually in the corresponding half of the uterus to the Fallopian tube it has just travelled down. *Garrigues*[1] says: "The fertilised ovum is, as a rule, arrested near the internal opening of one of the Fallopian tubes"—*i.e.* it is more to one or other side of the mid-line of the anterior or posterior uterine wall; it may be quite on the lateral wall; or it is in the corresponding cornu, or uterine horn, if the uterus be a double one. In the uniparous mammalia, too, the site of attachment (placental site) is usually in the corresponding horn to the ovary from which the ovum was derived, but not invariably so.

[1] Garrigues, "Obstetrics," 1902, p. 29.

The site *may*, however, be more to the opposite side of the uterus, or even in the opposite cornu or horn if the uterus is double; or again, it may be low down near the cervical orifice. We know not what determines its precise spot of anchorage; it can undoubtedly travel to *any part* of the uterine wall.

This occurrence of implantations of the oösperm in the horn of the uterus of the opposite side to the ovary from which the ovum was derived, has long been known; it occurs both in women and in mammals.

It may be due either to the ovum passing through the uterus from one side to the other, or else to its not entering the Fallopian tube on its own side, but passing along the surfaces of the intestines to the other side of the uterus, where it thus enters the opposite Fallopian tube. This is known as the migration of the ovum, internal and external respectively. I reserve the full discussion of the matter to Chapter XIII.

It is to be recalled that fertilisation of the ovum is more correctly fertilisation of the ovum nucleus. An account of the minute details after fertilisation, " not yet proved for human beings,"[1] but as studied in starfish, worms, and sea-urchins, by which the single male nucleus and female nucleus approach and coalesce, and how the oösperm thus formed divides or segments, to form the primary embryonic structures, is not necessary to the task of solving the cause of sex in man, and so I do not describe them.

[1] Whitridge Williams, " Obstetrics," 1913, p. 94.

CHAPTER VI

THE THEORY AND ITS EXPLANATION

THERE being, as we have seen, two ovaries, a right and a left, it follows that the ova produced are either right or left ova, also that as the right ovary is larger than the left, more right-sided ova are usually produced.

If, as must and does sometimes occur, the two ovaries each happen to have equally matured a Graafian follicle, we get a simultaneous, or nearly so, rupture of the follicles and discharge of the contained ova; that is, we get two ova to be possibly fertilised—for, of course, this does not necessarily always occur.

Should fertilisation of both occur, we get two fœtuses, or twins, owing their origin to the fertilisation of ova from different ovaries, the sexes differing, as we shall see later. This is not, however, the only mode of origin of twins, though it is the commonest; but I will refer to the subject of twins further on.

Much more frequently only one ovary matures a follicle, and a single ovum only is produced: if, now, as the result of the unilateral ovulation, the single ovum be fertilised, we get what is normal in mankind, viz. a single birth; if double or bilateral ovulation were the rule, and there were always two ova shed, surely both would usually be fertilised, and twins would become the rule and single pregnancies the exception, for it would not be expected that if two ova were *always* provided, one only would be fertilised and the other left.

This brings me now to the dominant influence of the supplying ovary over the sex of the resulting fœtus. The supplying ovary is in reality the ESSENTIAL FACTOR IN THE CAUSATION OF SEX.

This, then, is my theory, that the sex of the fœtus is

not due to the male parent, but depends on which ovary supplied the ovum which was fertilised, and so became that fœtus.

I find that a male fœtus is due to the fertilisation of an ovum that came from the right ovary, and a female fœtus is due to the fertilisation of an ovum that came from the left ovary.

I will explain the theory more in detail.

FIRST, then, my theory maintains that the male parent or father has *no* influence in the causation of sex, which rests entirely with the female or woman. She has in her two ovaries the already definitely sexed ova ready only for the fertilising action of the male semen, so that though man or the male fertilises the ripened ovum, he does not (to coin a word) *sexify* it or cause its sex.

No theory which I can discover has hitherto entirely dissociated the male parent, as I do; hence it is entitled to be called a new theory.

Every theory in which the father is credited with being even partly responsible for sex causation differs materially from mine.

In this category come a great many of the old and mythical theories. These in differing methods and ways ascribed to the two testicles, if not the chief, at least a great part in the *sexifying* of the ovum.

I do not propose to enter fully into these theories, none of which were based on clinical facts or cases, but will only shortly mention their chief points.

One maintained that sex was entirely due to the male—that the spermatozoa not only fertilised, but also gave the sex to the ovum.

Hippocrates thought that the future sex was determined by the relative prevalence of the male or female semen, either as to the quantity of it, or else the relative strength of it.

Leeuwenhoek went so far as to suppose he could see a difference of sex in the spermatozoa upon which depended the sex of the future fœtus.

Another theory maintained that fertilisation could only take place by the junction of the spermatozoa and ova of

the same side of the body, so that a left-sided ovum could not be fertilised by a right-sided spermatozoon, and *vice versa*.

This theory received the support of *Hencke*, who in 1786 wrote a book based on this assumption, also claiming that males were derived from the union of right spermatozoa with right ova only, and girls from the union of left spermatozoa only with left ova only. This theory differs therefore widely from mine, in spite of several critics, because I say the spermatozoa do not influence sex at all.

I fully discuss the question of the paternal influence on the sex of the future child in Chapter VII.

SECONDLY, my theory maintains that male ova are restricted to and come only from the right ovary, and female ova only from the left ovary.

It matters not from which testicle the spermatozoon is derived which fertilises the ovum, the essential point being that sex is due to the ova always having their definite and unalterable sex prior even to ovulation.

It follows that directly an ovum is fertilised, a boy or a girl has begun to be developed, and no external or other influence brought to bear on the mother can alter the sex of the future child.

To inquire why the ovary of the right side should have been chosen for the production of boys rather than the other side seems as fruitless and as useless as to inquire why the liver should have been placed to the right and the spleen to the left of the body.

Galen said it was due to the right side being warmer than the left, but how this can rank as cause and effect I know not.

It is, however, reasonable to suppose that the association of the left ovary with the production of the female sex is due to the fact that the muscularly weaker sex should arise from the muscularly weaker side of the body.

That the left side of the body is the weaker of the two is manifestly true, for as *Herman*[1] says:

"The left side is weaker than the right, not only in muscular strength, but in power of resistance to painful impressions. This is illustrated by the fact that in cancer, which has no preference for

[1] Herman, *op. cit.*, p. 71.

the left side rather than the right, pain is more common on the left side. So it is in displacements of the uterus, although the changes in this condition have no unilateral character; and in the pain down the thigh from hæmorrhoids."

So that the muscularly weaker sex are derived from the ovary of the left or weaker side, while the larger and stronger males come from the larger right ovary. *Dr. T. G. Moorhead*[1] has shown that a child even at birth begins its "existence with a marked right-sided bias."

Taking it for granted, then, that only one ovum is produced at a time, the question comes, from which ovary does it arise? There can be but little doubt that it is provided more or less alternately by first one ovary and then the other; for although there are two ovaries, and both are normally active, they do *not work synchronously:* one ovary only discharges an ovum at a time, so that double or bilateral ovulation is not normal. *Négrier*[2] says:

"The ovaries perform alternately, for I find in one ovary a recently ruptured follicle, and in the opposite ovary one coming forward."

Further, he says that:

"In women, having double uterus and vagina, the menses have come from each side alternately."

A case published recently by *Jurinka* proves this, as also does a case of *Engel's* (cf. pp. 170, 171).

That unilateral ovulation is the rule is proved post mortem by cases where only a few and definite number of menstrual periods have occurred. We are then able to see and count the cicatricial pits or scars, the remains of the corpora lutea, and find them *in the two ovaries together to equal the number of periods passed.* We do not find that each ovary has pits or scars equal in number to the number of menstrual periods; but that if, for example, as in one of the following cases, only three periods had been experienced during life, each ovary has not three pits or scars, but the two ovaries have three scars between them.

[1] Dr. T. G. Moorhead in "Transactions of Royal Academy of Medicine Ireland," 1902.

[2] Négrier, "Anatomical and Physiological Researches on the Human Ovary." Paris, 1840.

The following cases support and prove this:

Mr. Girdwood[1] exhibits a preparation taken from a young unmarried female who he knew had menstruated about thirty-six times.

"The ovaries presented several indentations or small cicatrices about the size of mustard seeds. From thirty-two to thirty-four of these marks could be detected—about eighteen in one, and sixteen in the other ovary."

"A young woman died under my care. She had menstruated three times. The surfaces of one ovary presented two cicatrices; that of the other, one."

"Jane C——, aged eighteen, died of consumption. She had menstruated only six times. We could readily detect five depressions or cicatrices—three on one, two on the other ovary; of a sixth we were doubtful."

I.e. there were not six ovulation scars in each ovary, but six in the two ovaries together.

"Miss G—— had been regular for two years previous to her sudden death. In her I found post mortem about twenty-two of the usual marks on the ovaries."

That is to say, there was definite proof of twenty-two ovulations by the two ovaries *together*, not by *each* ovary, as there would have been had ovulation been bilateral every month.

"Emma Bull died yesterday. Two years ago she menstruated, this being the first and only time she had ever had that secretion. I opened the body. The ovaries were plump and rather larger than usual, soft to the touch, and glistening. There was no mark or scar whatever on the right ovary; but on the left there existed a reddish part about the size of a mustard seed, which had quite the appearance of an ulceration skinned over."

That is, one menstruation, one ovulation scar in one ovary only.

In the following cases, examination of the ovaries *during* menstruation reveals only one ovary as having just ruptured a Graafian follicle—that is, one ovary only has ovulated.

[1] Braithwaite's "Retrospect of Medicine and Surgery," vol. vii. 1843, pp. 261-3.

[2] R. Lee, "Braithwaite's Retrospect," vol. i. 1840, p. 397.

Dr. R. Lee[2]—

"examined the body of a young woman who died *during* menstruation from inflammation of the median basilic vein. The left ovary was larger than the right, and at one point a small circular opening was observed in the peritoneal coat, which led to a cavity of no great depth in the ovary. The right ovary was in the ordinary state."

"A woman under twenty years of age died suddenly from acute inflammation of the lungs *while* menstruating. A red, soft, elevated portion of the right ovary was observed, and at one part the peritoneal coat to a small extent had been removed. Under the opening was an enlarged Graafian vesicle filled with transparent fluid. The left ovary presented a natural appearance."

Sir J. Bland-Sutton[1] says:

"The evening before the operation the patient *commenced to menstruate*. When the cyst was drawn up from the pelvis a small rounded aperture was noted in the peritoneal covering, from which a few drops of blood issued. Examination of the parts showed this to be a recently ruptured follicle."

That is, one ovary only, though in this case partially occupied by a tumour, had ruptured a Graafian follicle, coincidently with the onset of menstruation.

Dr. John Phillips[2] describes a case of a woman dying *during* menstruation from purpura hæmorrhagica:

"In the right ovary, at the site of the corpus luteum, there was a hæmorrhagic infarct the size of a marble."

In this case, therefore, menstruation had been accompanied by unilateral ovulation and the formation of a *single* corpus luteum, not one in each ovary.

Garrigues[3] says:

"The fact is, we, as a rule, find only one fully developed or ruptured follicle corresponding to a menstruation."

We are therefore justified in saying that the number of *pits, scars, or cicatrices in the two ovaries being nearly equal, and together equalling the known number of menstrual periods experienced, not only proves unilateral ovulation, but also necessarily implies that such ovulation must be practically alternate from the two ovaries.*

[1] Bland-Sutton, "Diseases of Ovaries," 1891, p. 46.
[2] J. Phillips, "Trans. Obstet. Soc.," vol. xxxiii. 1891, p. 395.
[3] Garrigues, "Obstetrics." 1902, p. 17.

In animals, too, in whom single pregnancy is customary, only one ovary ovulates at a time. This is borne out by the observations of *Heape*[1] on monkeys. These animals are monotocous—*i.e.* have but one at a birth—and he found the ruptured Graafian follicle *on one side only*. They had "a more or less prominent discharged follicle in one or other of their ovaries"—that is, *not* one in each ovary—so that ovulation had been unilateral and not bilateral.

Of course, in the polytocous animals—such as pigs, foxes, dogs, cats, rats, and rabbits, etc., where multiple births are the rule—each ovary ovulates, and yields several ova. It is only when the ovaries have provided ova that the female animal permits insemination; hence both ovaries in the polytocous animals act at the same time.

I have found as many as eight corpora lutea in one ovary of a rabbit, and six more in the opposite one, fourteen in all; while five corpora lutea in each of a sow's ovaries is not a very unusual number.

Every theory of the causation of sex hitherto brought forward, other than the association, in some way or other, of the right side with the production of the male sex and the left for the female sex, has been met and answered by a diametrically opposite or contradictory theory; thus—

Canestrini maintained that sex was due to the number of spermatozoa which entered the ovum. The greater the number of spermatozoa the more male children are produced; a few lead to girls being born.

Dr. J. Ross ("Lancet," 1884, p. 48) held just the opposite; he says: "A few spermatozoa lead to male offspring."

Geddes and *Thomson* ascribed the production of males to a katabolic habit of body, and of females to an anabolic habit.

Dr. Andrew Wilson, F.R.S.E. ("Lancet," 1891, p. 713), says exactly the opposite: an anabolic habit of body produces males, a katabolic habit of body produces females.

The theory that sex is dependent on the relative ages of the parents led to—

Hofacker and *Sadler* maintaining that the older parent produced its own sexed offspring.

This was directly contradicted from a larger number of cases by—

Berner and *Stieda*, who held that the younger parent produced its own sexed offspring.

Girou promulgated the comparative vigour theory—that the *stronger* parent produced its *own sexed* children, so that if a woman were the stronger a girl was born.

Vilson, *Romme*, *Van Lint*, and others, say just the opposite—viz., that the *weaker* parent produces its *own sexed* children, or the stronger parent breeds the opposite sexed child to itself, and thus a stronger woman should breed boys.

Mayerhofer advanced the view that it was the fresh and unexhausted state of the father which led to male offspring, so that when a bull or ram was fresh and newly turned among the cows or ewes he bred more males or his own sex.

Dr. P. Tuckey ("British Medical Journal," January 19, 1901) says just the opposite—that when a bull or ram is newly turned out among the herds of cows or ewes, the offspring of the females served early were mostly females; the later ones were males: that is, when the father was fresh and not exhausted he bred the opposite sex.

The theory, supported by *Robin* and by *Burdach*, that infrequent sexual intercourse leads to female children has been met by the opposite one held by *Mayerhofer*—that infrequent intercourse is responsible for the production of boys.

This fact I have here alluded to, that nearly every invented theory has found someone else bring forward another theory exactly opposite to it, is proof that neither of them could be the correct solution of the problem of the causation of sex.

But the exception to the above statement is the theory which I propound—viz. that the male parent has nothing to do with the sex of the offspring, which is absolutely the prerogative of the woman or female parent, who has in her two ovaries the different sexed ova—the male in the right ovary, the female in the left ovary.

This theory receives considerable confirmation from the fact that the right side of the body in both the male and female parents has always been allocated to the production of the male sex, and, *vice versa*, the left side has always been attributed to the female sex.

By this I mean that no one has ever yet, as far as I can discover, introduced an opposite theory, in which the right side has *in any way whatever*, or in either parent, been held responsible for the production of girls, or that the left side produced boys.

My theory, then, is remarkable as the only exception to the rule that, given a theory, an opposite or contradictory one is soon brought forward to disprove it.

In various ways and ideas, then, the right side has always been assigned to the male, and the left side to the girls or females. Thus—

The secretion of the right testicle plus that from the right ovary together produced boys, according to *Hippocrates*, *Anaxagoras*, and later *J. Hencke*.

The right side in both parents, because it was the warmer, produced boys, according to *Galen*.

Turning by the woman on to her right side after coition, to ensure semen falling into the right side of uterus, produced boys, according to *Avicenna* of Ispahan.

Habitually sleeping on the right side of the wife produced boys, according to *T. B.*, "Lancet," 1870.

Sex is due to the spermatozoa only: the right-sided spermatozoa are male, and produce boys, according to *Michael Scott*.

Sex is due to the ova only: the right-sided ova are male, and produce boys, according to *E. Rumley Dawson*.

Further, when pregnancy is present it has been said by *Albertus Magnus*:

If a pregnant woman in walking moves her right foot before her left, she will have a boy.

If in a pregnant woman the right breast is harder and larger, she will have a boy.

The following facts also serve to show in different ways the allocation of the right side to males:

Men, *Havelock Ellis* says, have better sight with the right eye, women better sight with the left eye; and in domestic matters it is curious that men have the buttons on the right, women have their buttons on the left side of their clothes; and whereas men usually put the right arm first into their coats, women usually begin with the left. But why there is this difference I have been unable to discover. The name Benjamin, too, is suggestive.

CHAPTER VII

DOES THE MALE PARENT OR FATHER INFLUENCE THE SEX OF THE COMING CHILD?

IT will come as a serious blow to the vanity of man to know that this question must be answered with a decided negative.

Man, or the male, has nothing to do with the causation of the sex of the future child.[1]

In the act of insemination, the semen comes *via* the ejaculatory ducts from both testicles simultaneously, and from the reservoirs or vesiculæ seminales which store the secretion from both the testicles. Out of this mixture of spermatozoa from the two testicles, some chance spermatozoon fertilises the carefully prepared and sexually distinct ovum derived from a single ovary. Which spermatozoon[2] from the number which collect around an ovum actually does fertilise the single ovum nucleus must be purely a matter of chance, but man's part in fertilisation and generation has ceased with the supplying of this single chance spermatozoon. Can we credit, then, that this sperm-cell, rapidly formed in the testis, can be the instrument chosen from among hundreds of thousands of others to determine the sex of the future child?

Its life-history is so short, and its successful junction with the ovum so much a matter of chance, that it compares very unfavourably with the ovum, which, though truly only a single cell, has enjoyed almost a monopoly in the maternal production.

[1] This statement seems to have much perturbed one of the critics of my book; for, reviewing it in a scientific journal, he opined that not only was I "not justified in making the statement," but that "this part of the theory asks us to accept too much"; for, wrote he, "without a male there will be no offspring, either daughters or sons"! Could criticism, considered crushing, be more frivolous or inane?

[2] I here assume that only one spermatozoon is requisite for fertilisation.

This ovum, which was present in its mother's ovary prior even to her own birth, has been carefully preserved for some twenty-five years; if the woman is of that age, and for some months has been an object of careful preparation and maturation, it is therefore no chance production. It carries with it, I say, its definite unalterable sex, and awaits only fertilisation.

That the human ova have their sex already definitely fixed prior even to their dehiscence, I stated in my paper in the Obstetrical Society's "Transactions" for 1900, vol. xlii., p. 356. The male ova arise from the right ovary and the female from the left ovary, so that the female infant is born with her primitive ova already either male or female, and thus the causation of sex comes to be dependent on the woman alone.

From a leading article in "The British Medical Journal"[1] I see that *Dr. Lenhossék*, Professor of Anatomy at the University of Budapest, has quite recently expressed a similar belief. He says the sex of the offspring is determined before impregnation takes place.

"It follows, then, that the sex of the offspring is decided not by both, but by one only of the parents, and Professor Lenhossék is of opinion that biological experiments show that it is the mother, and not the father, that possesses this power. The sex of the ovum is fixed before the spermatozoon fertilises it."

That our microscopes are not at present powerful or complete enough to differentiate a male from a female ovum is admitted, but we may by an improved microscope or Röntgen or other rays be able to some day thus recognise a difference in them.

To quote again from "The British Medical Journal":

"The ova in the human subject, and in many of the animals, do not indeed show any sexual dissimilarity either in their histological or in their chemical characters; but similarity in these details may be only apparent, not real. Nature is constantly teaching us that dissimilarity may exist when we cannot perceive it. He is a bold histologist who will nowadays maintain that no difference exists between two masses of protoplasm simply because his microscope reveals to his eye no difference between them."

[1] May 9, 1903, p. 1101.

I have already said the causation of sex is dependent on the woman alone; it comes to be essentially her prerogative. She prepares an ovum (male or female) in much the same way as a parlour-maid prepares and lays a fire—it may be a coal or a wood one—and waits for the match to be applied before the fire develops. The application of the match to the fire in the grate, whether wood or coal, starts the fire—it does not make a coal fire into a wood one or *vice versa*; and in a similar manner the penetration of the spermatozoon into the prepared ovum starts the process of development of a child, a boy or girl being produced according to which ovary prepared the ovum. Hence the part played by man is that of applying the match or stimulus which starts the process of development and growth of the offspring from the ovum. Man, in fact, is the fire-lighter, not the fire-layer. Man fertilises the ovum; he does not sexify it.

Aristotle long ago held that woman supplied the primary material for the development of the future individual; and it was the function of the man to *give the impulse* in consequence of which the future individual came into being: I now apply this to sex causation. The **woman** supplies a definite and unalterable sexed ovum, the prospective maleness or femaleness of her ova being fixed prior even to her own birth; **man** supplies the stimulus which causes the first steps in the child's development; together the **man and woman** impart to it, in varying degree, its individuality, its heredity, its ancestral characteristics and likenesses.

We shall now see how clinical facts and cases support these views: that the male parent does *not* influence the sex of the coming child is proved by such cases as these, where a woman has *one-sexed children only by different men*; thus:

Mrs. V. L.	by her	first	husband	had	2 girls	0 boys by either.
,,	,,	second	,,	,,	4 ,,	
Mrs. S. A.	by her	first	husband	had	2 girls	0 boys by either.
,,	,,	second	,,	,,	3 ,,	
Mrs. P. J.	by her	first	husband	had	5 girls	0 boys by either.
,,	,,	second	,,	,,	1 girl	

Mrs. R. L. by her first husband had 1 girl } 0 boys by
„ „ second „ „ 3 girls } either.
Mrs. P. B. by her first husband had 2 girls } 0 boys by
„ „ second „ „ 2 „ } either.

Mrs. Mk. by her first husband had 4 boys } 0 girls by
„ „ second „ „ 3 „ } either.
Mrs. S. by her first husband had 3 boys } 0 girls by
„ „ second „ „ 3 „ } either.
Mrs. L. T. H. by her first husband had 2 boys } 0 girls by
„ „ second „ „ 1 boy } either.
Mrs. L. D. by her first husband had 4 boys } 0 girls by
„ „ second „ „ 1 boy } either.
Mrs. W. by her first husband had 2 boys } 0 girls by
„ „ second „ „ 1 boy } either.

Surely if the husbands settled the sex, the above mothers would have had mixed children, instead of only one-sexed children by two different men; the wives were unilaterally sterile. These cases show that the spermatozoa of two different men were quite unable to produce both sexes in certain women, so that sex determination does not lie in the spermatozoa.

In the following cases the husband of more than one wife gets one-sexed children only from each wife; but as they differ in the different wives, while the sexual act is the same for each wife, the inference must be that the wife settles the sex.

Mr. G. Y. by his first wife had 3 girls, 0 boys.
„ „ second „ 3 boys, 0 girls.
„ „ third „ 1 boy, 0 girls.

Mr. L. by his first wife had 3 boys, 0 girls; then he married a widow *who already had one girl by her first* husband; by the widow, his second wife, L. had 3 girls, 0 boys.

Mr. P. by his first wife had 3 boys, 0 girls.
„ „ second „ 5 girls, 0 boys.
Mr. S. by his first wife had 7 boys, 0 girls.
„ „ second „ 1 girl, 0 boys.
Mr. H. B. by his first wife had 3 boys, 0 girls.
„ „ second „ 4 girls, 0 boys.

In the above cases the fathers produced both-sexed children with *different* wives, but only *one* sex with *each* wife,—*i.e.* the father did not influence the sex; the women were "unilaterally" sterile.

In the following cases the man gets both-sexed children with one of his wives, but only one sex with the other, because she is "unilaterally" sterile; if it depended on the male he should get both-sexed children with both wives.

Mr. Mll. by his first wife had four girls, no boys; by his second wife had first, a girl; second, a boy; third, a girl.

Mr. P. by his first wife had 5 boys, 0 girls.
,, ,, second ,, 1 boy, 9 girls.
Mr. C. by his first wife had 2 boys, 7 girls.
,, ,, second ,, 4 boys, 0 girls.
Mr. P. T. by his first wife had 3 girls, 0 boys.
,, ,, second ,, first 1 boy, then 1 girl.
Mr. K. by his first wife had 2 boys, 1 girl.
,, ,, second ,, 2 girls, 0 boys.
Mr. T. F. by his first wife had 5 girls, 0 boys.
,, ,, second ,, 2 girls, 1 boy.

MONORCHIDS.—In those cases where men have only one testicle—*monorchids*, as they are called—we should expect, unless we assumed that both testicles contain spermatozoa able to determine both sexes, that, if the male settled the sex, all the children he had would be of one sex only, and would correspond in sex to the testicle he possessed; but this is not so, and the following cases practically prove it:

C. W., examined by me, has no sign of a right testicle or cord; he has the *left testicle only*. His wife has had 3 children by him: 2 boys, 1 girl.

J. F., examined by me, has the *right testicle only*; there is not, and never has been, any sign or sensation of a left one. His wife has had 4 children by him (2 boys, 2 girls) thus: (1) Boy, (2) girl, (3) girl, (4) boy.

H. P., a medical man, has the *right testicle only*; never had any sign, he says, of a left one, being born with the one only. His wife has had 3 children by him: first a boy, then 2 girls.

The above three very typical and interesting cases show that a man with one testicle only can give rise to the birth of either-sexed children; also that the spermatozoa from each testicle have not their own particular, definite sex, according to which testicle they arise from—they are, indeed, asexual or sexless.

The cases quite disprove the Hippocratic idea that spermatozoa from one testis can only fertilise the ova from the ovary of the corresponding, or even the opposite, side.

The spermatozoa from *either* testicle are thus proved able to fertilise the ova from either ovary, or even both ovaries, and so give rise to either-sexed children—in fact, a monorchid can be father of boy and girl twins. This fertilising of an ovum is quite different to initiating its sex, or "sexifying" it.

That the male parent or father has nothing to do with the causation of sex is borne out by animals also: I have noticed that in them a certain female will give with different males all the same sex of offspring.

Knight, quoted by *W. B. Carpenter*,[1] as long ago as 1809, remarked that:

"In flocks or herds of domesticated quadrupeds, it is no uncommon thing to meet with females, whose offspring is almost invariably of the same sex, although it have resulted from intercourse with several different males; on the other hand, he has never met with males that exhibited any such uniformity in the sex of their offspring with different females. Hence he concluded that the female parent exercises the chief influence in determining the sex."

In support of the truth of this statement the following cases in my own experience will suffice:

A brown retriever bitch known as "Brownie" had four pups, all bitches—no dog pups.

A black-and-tan bitch was covered by two different stud dogs at different times; at the

First litter she had 2 dogs } no bitch pups.
Second ,, ,, 4 ,, }

that is, two different fathers could not produce female

[1] "Principles of General and Comparative Physiology," 1841, p. 500.

offspring. Both these stud dogs the writer knows possessed both testicles. I mention this because many owners remove one testicle from dogs, fox-terriers especially, and this does not cause one sex pups only to be born to any bitch they may line. It has been proved, too, that a unilaterally castrated bull similarly produces calves of both sexes. Hence the male animal does not determine the sex.

A cow was covered by fifteen different bulls, and she had seventeen calves, all cow or female calves—that is, fifteen different fathers could not breed a male between them. Surely if the male parent influenced the sex, we should have expected fifteen different males to be able to breed a bull between them.

A mare was covered by more than six different stallions (some being used more than once). She had ten different foals, all males—that is, she never once had a filly or female foal. The multiple fathers could not affect the sex of the foals. The mother evidently was *unilaterally* sterile, only the right ovary being active. And in the same way the bitch and cow must have been unilaterally sterile, so that the multiple fathers could only produce one sex.

And lastly, from the " Daily Mail " I read:

" A sow belonging to Mr. A. Watson, of the Grange Farm, Clavering, has given birth to a litter of ten, all of which are boar pigs."

CHAPTER VIII

CASES OF PREGNANCY WHICH PROVE THE THEORY

In order to prove my theory that the cause of the male sex is due to the fertilisation of ova derived from the *right ovary only*, it will be necessary to show cases of male pregnancy with the corpus luteum in the right ovary.

We have seen that normally one ovary discharges a single ovum, and this when fertilised leads to the normal single pregnancy; if on examining a child we find it to be a male, and the right ovary to contain a well-marked true corpus luteum, we are justified in saying that the ovum from that right ovary produced a male fœtus. This I find to be always so, and the following cases will prove it.

Jemima H., age 40, four months pregnant. Admitted an in-patient at Westminster Hospital for stiff knee-joint.

She suddenly developed acute suppurative peritonitis, which led to her aborting. The fœtus was removed shortly before her death, which occurred on November 30th, 1889.

On examination the fœtus was found to be a male.[1] Post mortem the left ovary was normal, the right slightly enlarged, and containing a *well-marked corpus luteum.*

Tufnell's[2] case.

"The patient had seven years before given birth to a living child. Again pregnant. . . .

"Post mortem three or four quarts of fluid and clotted blood were found in the abdomen, with a small fœtus floating therein. There was a rent in the right Fallopian tube, and a cyst, from which the fœtus had escaped. Right Fallopian tube and ovary agglutinated: fœtus one inch long. The *uterus contained a healthy male* fœtus, proportionate to the date of conception. The cystic cavity in the

1 By Drs. J. B. Potter, R. G. Hebb, and E. Rumley Dawson.

2 Tufnell, "New Sydenham Society's Year Book," 1862, p. 339.

right Fallopian tube contained a solid organised mass like a miniature placenta. There were *two* distinct *corpora lutea* in the right ovary."

We have here two fœtuses and two corpora lutea in the same ovary, the right; the sex (male) is only given of the intra-uterine fœtus. It is a twin male conception undoubtedly, the second fœtus developed in the right tube, and must have been a male. Cf. Chapter IX.

Dr. H. R. Spencer's[1] three cases of Porro's operation.—Dr. H. R. Spencer removed the pregnant uterus owing to cancer obstructing delivery in the third case.

"The child extracted was a boy, and there was a well-marked corpus luteum in the right ovary."

Mrs. P., of Leyton, was delivered of a boy, who survives. The patient died of puerperal septicæmia. At the post-mortem, at which I was present, there was a well-marked corpus luteum in the right ovary, none in the left. Placental site was rather more to the right than to the left of the mid-line of the anterior wall of uterus.

Dr. Macnaughton-Jones [2] describes a case of first pregnancy in a woman the subject of a large suppurating cyst of the left ovary, which had become so large as to increase the size of her abdomen a year previously to her becoming pregnant.

"The patient, aged 31, was delivered of a healthy male child. On operating, the tumour was found to be a cystoma of the left ovary, from which an enormous quantity of pus was evacuated. The right ovary I examined, and found normal."

Here it is evident that a large suppurating cyst of the left ovary did *not* provide the ovum which was fertilised, but the right *ovary must have done* so. As this was healthy, it was not opened at the operation, so the presence of the corpus luteum therein must be inferred. The child born was a boy, and the right ovary only was healthy.

Meredith's[3] case.—Both ovaries diseased, right the least. Child a male. Performed double ovariotomy during pregnancy.

[1] H. R. Spencer, "Trans. Obstet. Soc.," 1896.
[2] Macnaughton-Jones, "Trans. Obstet. Soc.," 1900, p. 141.
[3] W. A. Meredith, "Trans. Obstet. Soc.," 1892, p. 240, etc.

"The larger tumour of the two was extremely multilocular. The right ovary, situated anterior to the main or larger tumour, contained one main cavity, etc."

"Subsequently the pregnancy terminated in the birth of a well-developed boy."

It is only reasonable to expect that the ovary that was only slightly affected should have yielded the ovum. It was the right ovary that had the smaller tumour, and the resulting child was a boy.

On the other hand, I find that the female sex is due to ova which arise from the left ovary only: to prove it it is necessary to give cases of female pregnancy with the corpus luteum in the left ovary, thus:—

Dr. Amand Routh,[1] in a case of "Uterine appendages showing Hæmatosalpinx," says:

"These bilateral appendages were removed. The uterus was enlarged, and this condition, with the dilated tube and the corpus luteum, was taken to mean that an early tubal gestation was present, especially as the corpus luteum was on the same side as the tubal swelling."

Subsequently the patient was found to be pregnant five months—

"So that at the date of the removal of the appendages she must have been two and a half months pregnant. Her labour was uneventful. Her child was small."

Dr. Routh now informs me that the corpus luteum was in the left ovary; the child when subsequently born was a girl.

Dr. Herman's[2] case.—Disease of right ovary. Child female. No corpus luteum mentioned.

"On the right side a cheesy-matter-containing body was attached to the right broad ligament: examined microscopically it was thought to be the ovary. The fœtus was a female?"

The right ovary being disintegrated and diseased, the left ovary must have supplied the ovum, and the child was consequently a female.

[1] Amand Routh, "Trans. Obstet. Soc.," 1898, p. 307.
[2] Herman, "Trans. Obstet. Soc.," 1897, pp. 135-7.

Dr. H. R. Spencer's[1] three cases of Porro's operation.—Dr. H. R. Spencer removed the pregnant uterus owing to fibroids in the first case. The child was a female, and though the corpus luteum is not mentioned, it is distinctly stated that the left ovary was *larger* than the right.

The presence of a true corpus luteum invariably temporarily increases the size of the ovary in which it is contained, until it shrinks and disappears; so that in this case it is reasonable to conclude that the larger size of the left, or normally smaller ovary, was due to the presence therein of the corpus luteum of the pregnancy.

Gerrish[2] says:

"During pregnancy the gland (ovary) which contains the corpus luteum is much larger than its fellow."

And the difference in the size of the two ovaries caused by the presence or absence of the corpus luteum was strongly insisted on by *Montgomery* in 1837, in his book "Signs and Symptoms of Pregnancy," in which, besides giving a special plate, No. X., of such ovaries, he gives on p. 221 measurements to prove it.

[1] H. R. Spencer, "Trans. Obstet. Soc.," 1896, pp. 397 and 399.
[2] Gerrish, *op. cit.*, p. 849.

CHAPTER IX

CASES OF EXTRA-UTERINE PREGNANCY WHICH PROVE THE THEORY

EXTRA-UTERINE pregnancy is the technical term for cases where a child develops in the wrong place—*i.e.* outside the uterus or womb.

The commonest position for the child to grow in, outside of the womb, is in one or other Fallopian tube, hence these cases are called tubal pregnancies. In a few instances it actually grows in the ovarian sac or Graafian follicle which contained the ovum, hence this is called ovarian pregnancy.

In the very great majority of cases of tubal pregnancy, the *tube* which becomes *pregnant* is the one on the *same side of the uterus as the ovary* which supplies the ovum which becomes fertilised—*i.e.* in the tube nearest the ovary.

The following cases will prove that the pregnancy and the corpus-luteum-bearing ovary are usually on the same side.

Dr. Pocock's case.[1]—Pregnancy in right tube; corpus in right ovary. Case of extra-uterine gestation.

"The fœtus had escaped from the ruptured sac formed at or near the fimbriated extremity of the right Fallopian tube, where the placenta was placed. There was a well-marked corpus luteum in the right ovary. The fœtus was about three months."

No sex is given, and though I wrote privately for it I could not discover it.

E. Rumley Dawson's case.[2]—Pregnancy in right tube; corpus in right ovary. The right Fallopian tube had contained the fertilised ovum.

"The right Fallopian tube had ruptured. The right ovary contained a corpus luteum."

The embryo was too young to distinguish its sex.

[1] "Lancet," March 3, 1888, p. 416.
[2] "Trans. Obstet. Soc.," 1898, p. 156.

Dr. W. Duncan[1] describes and has a drawing of a case of tubal gestation.

"The right tube had ruptured. The right ovary contained a large corpus luteum."

Dr. Lewers[2] describes a case of right tubal pregnancy:

"There was a large corpus luteum in the right ovary; no corpus uteum in the left ovary";

and again, p. 364:

"Left tubal (interstitial) pregnancy; corpus luteum in the left ovary."

Dr. Cullingworth[3]: also a right tubal pregnancy.

"The right ovary contained a corpus luteum ½ in. in diameter. Left tube and ovary were normal."

Dr. Amand-Routh[4]:

"Pregnancy in left tube; corpus luteum in left ovary. The right tube was normal; a nodule could be felt on the left tube."

The report on the specimen by Mr. J. H. Targett says:

"The specimen consists of the (left) Fallopian tube, ovary, and adjacent portion of the broad ligament. The ovary contains a recent corpus luteum. The Fallopian tube is dilated with an oval cyst. The histological evidence of gestation is thus assured."

B. Dyball[5] reports:

"Left tubal pregnancy, and the left ovary contained a corpus luteum of pregnancy ½ in. in diameter."

Sir J. Bland-Sutton has diagrams illustrating the corpus luteum on the same side as the tubal pregnancy in his "Diseases of Ovaries," 1896, Figs. 105, 108, 115; and Fig. 95 in "Diseases of Women," 1904.

This is still further proved by cases of *repeated* tubal pregnancy; thus:

[1] "Trans. Obstet. Soc.," 1894, p. 68; *cf.* also 1896, p. 36—a similar case.
[2] "Diseases of Women," 1897, p. 375.
[3] "Trans. Obstet. Soc.," 1895, p. 143.
[4] *Ibid.*, 1898, p. 222.
[5] B. Dyball, "Case of Tubal Gestation," "Brit. Med. Journ.," March 26, 1904, p. 718.

Dr. Lewers[1] describes a case where he removed the left pregnant tube and the left ovary, which contained the corpus luteum, in 1894; becoming pregnant again in the remaining, or right tube, that too was removed in May 1900, the accompanying right ovary necessarily containing the corpus luteum.

In the "Journal of Obstetrics and Gynæcology of the British Empire," vol. iv. p. 301, I have reported a very similar case, the left ovary containing the corpus luteum when the left tube was pregnant, and the right ovary necessarily doing so when the right tube became pregnant two years later, for the appendages of the opposite side had been removed.

And similarly *Lieut.-Col. A. J. Sturmer*, in the same volume (p. 139), has reported two such cases, the *corpus luteum* being on the *same* side as the *pregnant tube* in *each* case.

Opitz,[2] quoted by Dr. Russell Andrews, "found the corpus luteum on the same side as the pregnant tube in fifteen out of eighteen cases."

The above cases, then, should suffice to prove that the pregnant tube and the corpus luteum-bearing ovary are usually on the same side; but cases might be indefinitely multiplied.

From this fact it follows that if we find a pregnancy in the right Fallopian tube, and that fœtus is a male, even though the presence of a corpus luteum be not mentioned, we are quite justified in declaring the ovum came from the right ovary, or ovary of the corresponding side to the tube.

The following cases of this therefore support my theory that ova from the right ovary produce male children.

Taylor's case.[3]—Abdominal pregnancy. Right tube, male child.

"The pregnancy may be regarded as originally one of the right Fallopian tube. The child weighs 7 lb., and is a male fœtus."

"It was impossible to say whether the right ovary had been removed with the placenta, or whether it had been left in the pelvis below the reflections of the sac."

[1] "Trans. Obstet. Soc.," 1900, p. 325.
[2] "Journal of Obstetrics and Gynæcology," vol. iv. p. 290.
[3] J. W. Taylor, "Trans. Obstet. Soc.," 1897, pp. 183-5.

Dr. Cullingworth's case.[1]—Sac on right side; male child.

"The sac containing the fœtus consisted of the right *broad* ligament. The stretched Fallopian tube ran diagonally upwards and outwards, and then ceased to be traceable as a distinct tube.

"The fœtus was one of the male sex."

Sir J. Bland-Sutton's case.[2]—Right tubal pregnancy. Drawing shows sex male, and (?) corpus luteum in right ovary.

"Fluid blood has escaped from a rent in the right broad ligament. The Fallopian tube on that side was enlarged, and was removed with the ovary. The embryo appears to have lodged in the right Fallopian tube."

The drawing which accompanies the case shows the fœtus to be a male, and what is *possibly* the corpus luteum in the right ovary, for the left was *not* removed.

In the following case in the practice of one of my colleagues the patient was thought to have inflammation of the right ovary. She died from hæmorrhage internally rather suddenly on March 18, 1899.

At the post mortem which was ordered I found that the left Fallopian tube and left *ovary were normal*, and there was *no* corpus luteum in it. The gestation sac was formed from the right Fallopian tube, which had burst between the layers of the right broad ligament. There the child (a boy) continued to develop for nearly three months longer, when a second rupture into the peritoneal cavity took place, killing the patient by the extent of the hæmorrhage. The right ovary and corpus luteum could not be found. The child (a male) had developed in the right Fallopian tube, and the left ovary did *not* contain a corpus luteum; so we know the right ovary had originally provided the ovum.

In the following case the child (a boy) had originally begun to develop in the right Fallopian tube, from which it passed to finish its development in the abdominal cavity, forming the so-called tubo-abdominal form of pregnancy. The afterbirth or placenta continued to chiefly develop in the right tube. There is no account of the corpus luteum, as the right ovary would probably be destroyed in the growth of the child and its placenta.

[1] C. J. Cullingworth, "Trans. Obstet. Soc.," 1893, pp. 157, 159.
[2] J. Bland-Sutton, *Ibid.*, 1891, pp. 71, 72.

J. B. Hellier[1] says:

"A dead fœtus was removed by abdominal section from the peritoneal cavity, together with a tumour which arose from the right oviduct, and contained the placenta. It was then found that the right foot was attached to a pelvic tumour which lay in the utero-vesical pouch and on the right side. The fœtus is a male. The placenta is contained within a sac . . . made up partly of the ampullar end of the tube."

Dr. M. Abdul-Hamid, medical officer to Kalioub Hospital, Egypt, has reported a similar case. The pregnancy was in the right tube, which ruptured into the abdominal cavity, whence Dr. Hamid removed the male fœtus two months after full term by abdominal section.

Slamjer[2] in 1901 reported a case where the fœtus was a male, and had developed in the right broad ligament a right mesometric gestation.

In the "Medico-Chirurgical Review and Journal," vol. x., 1828, p. 223, is the case of Mrs. E. Bryan, who died as the result of an extra-uterine gestation. The child was "a full-grown male infant." It had developed in the right Fallopian tube originally, and had then, after rupture, continued to grow between the layers of the right broad ligament—a right mesometric gestation.

"The left ovarium and corresponding Fallopian tube are sound."

In the same journal (vol. v., 1826, pp. 618, 619) is another case. Post morten a male fœtus was found to have escaped by rupture from a cyst on the right-hand side of the uterus, which had arisen from the right ovary.

Dr. Russell Andrews[3] has reported a case of twin pregnancy in the right Fallopian tube. Both children were males.

In the same manner, pregnancy in the left tube practically always means a left ovulation; so that finding a female fœtus in the left Fallopian tube, even in the absence of mention of a corpus luteum being present in the left ovary, may be taken as proof that the left ovary provided the ovum

[1] Hellier, "Trans. Obstet. Soc.," vol. xlv. 1903, p. 366.
[2] "Brit. Med. Journ.," Epitome.
[3] "Trans. Roy. Soc. of Med.," vol. ii. 1909, p. 228.

that was fertilised, and hence gives support to my theory; thus:

Sir Jonathan Hutchinson's case.[1]—Left tubal gestation. Child female. Corpus luteum not mentioned.

"At the post-mortem examination we found the tumour adherent everywhere to the abdominal wall and omentum. On cutting into the cyst the body of a macerated fœtus was found. It was a female, and at full term. On further dissection of the parts the case proved to be one of gestation in the left Fallopian tube. The left Fallopian tube could be traced for a short distance on the front of the cyst. The left broad ligament passed downwards from the front of the cyst, and between its extremity and that of the Fallopian tube was a thickened mass, which might perhaps be the remains of the ovary, but it was not practicable accurately to identify it."

Dr. Cullingworth's case.[2]—Left tube; child female. No corpus luteum given.

"On August 16, at St. Thomas's Hospital, Dr. Cullingworth removed a fœtus weighing 2 lb. 13 oz., and measuring 17 in. in length, through an incision in the anterior abdominal wall. The sac in which this was contained was very thin, and formed by the greatly dilated left Fallopian tube. The duration of the pregnancy was sixteen months; the fœtus was well preserved, and had the appearance of fully eight months' development."

On writing to *Dr. Cullingworth* to ascertain the sex, he says (September 1, 1888): "The *child was a* female."

Lawson Tait[3] quotes a case by Dr. Wagner. Left tube and ovary implicated. Child female.

"The patient up to the age of twenty-four had given birth to five children; in her thirty-seventh year she again became pregnant, but was never delivered of the child. Labour pains were not present. For a long time the abdominal enlargement remained constant in size, and Cæsarean section was advised. Finally the tumour began to grow smaller. Her menses returned, and fair health was experienced, the only complaint being a feeling of weight in the abdomen. At the autopsy the tumour was found to fill the lower pelvis. The tumour weighed about ¾ lb., and was about the size of a man's head. It was covered by a yellowish membrane. The left *tube and ovary* seemed to be growing from the tumour, the uterus being pushed from the right. The fœtus was of female sex."

[1] "Case of Extra-uterine Fœtation simulating Ovarian Dropsy," "Lancet," July 19, 1873, p. 71, by Sir J. Hutchinson, F.R.C.S.

[2] "Lancet," August 25, 1888, p. 391.

[3] "Lectures on Ectopic Pregnancy and Pelvic Hæmatocele," p. 102, 1888.

Dr. Ruth reports a case in the "Medico-Chirurgical Review and Journal," July 1825, p. 285, of the removal of a dead extra-uterine fœtus from the abdominal cavity. It had evidently been a left tubo-abdominal gestation:

"The umbilical cord was traced over the uterus to the left side, where it was lost in a softened mass, probably the remains of the placenta. The child was found to be a female."

Dr. A. Smith[1] describes a somewhat similar case—a left tubo-abdominal pregnancy. "The placenta was attached to the brim of the pelvis on the left side." The main blood supply came from the left ovarian artery. The left tube and ovary were destroyed by the growth of the child, which was a full-time female.

Dr. Lionel Stretton[2] reported the removal of a dead female fœtus from the left broad ligament. It had been retained many years.

In the two following cases we have twin pregnancies, one in the uterine cavity, the other extra-uterine, that is, in one or other Fallopian tube. As we have already seen, the pregnant tube almost invariably obtains its oösperm from the ovary of the same side; and as twins or even triplets can occur in one tube, it is reasonable to claim that the uterine child was derived from the ovary of the opposite side to the pregnant tube—thus *Warnek*[3] found on operation a pregnant left tube, while the uterus gave birth to a boy.

So that this male had been derived from the opposite ovary to the left, that is the right.

Mrs. Stanley Boyd[4] removed a pregnant right tube (ovum evidently derived from right or male ovary), and the uterus contained a female child, which similarly must have been derived from the left or opposite ovary.

This case is further an example of failure to remove all ovarian tissue, owing to the "adhesions to the pelvic wall and the right side of the uterus" evidently preventing the

[1] Dr. Alfred Smith, "Brit. Med. Journ.," October 5, 1901, p. 961.
[2] "Lancet," March, 1909.
[3] Warnek, "Brit. Med. Journ.," Epitome, January 25, 1902.
[4] "Brit. Med. Journ.," October 5, 1901, p. 962.

entire removal of all ovarian tissue, probably in the ovarian ligament, though there are other possible sites.

It is of course evident that in very many cases, owing to the early rupture of the Fallopian tube, the sex of the contained fœtus cannot be ascertained.

Dr. Seligson, of Moscow, has, however, collected fourteen cases of males developing in the right tube, and females in the left tube.

The following are cases of pregnancy occurring in the right ovary (right ovarian pregnancy); the sex of the children was male, thus supporting my theory.

Bernutz and Goupil[1]:

"A woman, aged 34, had had three children prematurely, and was pregnant the fourth time, the condition being accompanied by extreme prostration and a good deal of pain on the right of the pelvis. At the end of the third month she expelled *per vaginam* a mole the size of an egg [the uterine decidua.—E. R. D.]. Six days after this she experienced most agonising pain in the hypogastric region, accompanied by severe vomiting, and soon after this she died.

"On examination a male fœtus was found in the right iliac fossa, but still attached to the right ovary by the umbilical cord. The ovary itself was ruptured on its under side. The organs on the left side were healthy. The uterus was much thickened, and large enough to admit a fœtus of three months; such an one was found in the abdomen."

Bernutz and Goupil[2]:

"A lady had borne eight children when, after an interval of five years, she became pregnant for the ninth time.

"At the third month she became very weak, had colicky pains, with symptoms of approaching labour, and died in nine hours. On opening the abdomen a large quantity of blood was found effused, and in removing this a male fœtus about an inch long was discovered.

"It was found afterwards that the right ovary was ruptured in its length, and that the fœtus had been developed therein."

[1] Bernutz and Goupil, "Diseases of Women," vol. i. p. 249, published by New Sydenham Society, 1866, quoted from "Bibliothèque médicale," vol. xxxviii. p. 265; and Dezeimeris, "Journal des connaissances médico-chirurgicales," 1837.

[2] Vol. i. pp. 249, 250. Quoted by Bernutz and Goupil from "Observation de M. de Saint Moressy, médecin de Riberac en Saintonge," 1662 (dans Duverney, "Œuvres anatomiques," Paris, 1761, vol. ii. p. 350).

The following is a case of pregnancy in the left ovary (left ovarian pregnancy): the child was a girl, thus proving my theory that left-sided ova produce female children.

Reeves' case.[1]—Left-sided pregnancy; child female. Right ovary cirrhotic.

"On opening the abdomen a large tumour was exposed. The shoulder and head of a fœtus were then felt. The broad ligament was then tied close to the uterus. The placenta was inside the fœtal membranes, which were enclosed between the layers of the left broad ligament, and the normal-looking Fallopian tube was stretched across the upper and anterior aspect of the tumour. No trace of the left ovary could be seen or felt, and in peeling off the membranes, which were firmly adherent in places, a portion of the posterior layer of the broad ligament, corresponding to the usual position of the ovary, was removed with them.

"The right *ovary was cirrhotic*, and was not removed. The fœtus, which looked like a full-termed one, was a female."

Mr. Reeves says, "There can be no doubt this was a genuine case of true ovarian pregnancy."

Whether this was a true ovarian pregnancy or not is immaterial; it was an undoubted left-sided pregnancy, with the resulting fœtus a female.

That the ovum came from the left ovary is rendered quite evident by the fact of the *cirrhotic* condition of the opposite or right ovary; it is thus a very convincing case.

[1] H. A. Reeves, F.R.C.S.Edin., "Ectopic Ovarian Gestation," "Lancet," October 25, 1890, p. 872.

CHAPTER X

CASES OF PREGNANCY AFTER OPERATIONS ON THE OVARIES, WHICH PROVE THE THEORY AND SHOW THE EFFECT ON CHILDBEARING OF OPERATIONS ON THE OVARIES

THE removal by a surgical operation of an ovary, usually on account of a tumour therein, is known as ovariotomy; if performed on one side only it is known as unilateral ovariotomy, or more definitely as right or left ovariotomy, according to which ovary was removed; if performed on both sides, it is a bilateral or double ovariotomy.

Unilateral ovariotomy does not prevent a woman having children, but they will, I maintain, be all of the same sex, provided that all ovarian tissue is removed from the one side. In this event all the ova must necessarily be derived from one ovary only, viz. from the ovary on the opposite side to the one removed.

If therefore the left ovary is completely removed a woman's subsequent children are all boys. In the following cases the left ovary *was* removed, and the subsequent pregnancies gave rise to boys because the ova necessarily were derived from the right ovary, hence they prove my theory.

Dr. J. A. Wetherell's case.[1]—Left ovary removed, subsequent birth of male child. Conception after ovariotomy.

"The patient, Ann H., unmarried; at the age of twenty-five, in 1882, her menstruation became irregular, and she first noticed a tumour rising in her abdomen. Her medical attendant diagnosed the case as one of ovarian tumour. She placed herself under the care of Dr. Granville Bantock in the Samaritan Free Hospital. The case was one of fibroid tumour of the uterus in a state of cystiform degeneration. I tried to lift out the tumour, but it so invaded

[1] "Lancet," April 28, 1888.

the broad ligament on the right side that its removal in the usual way was impossible. Fancying there was nothing to be done but to remove the ovaries, with a view of checking the growth of the tumour, I removed the left ovary, which was easily got at.

"The right ovary was nowhere to be found.

"I now looked again very carefully at the tumour, and as it felt as if there might be some deep-seated fluid in it, I tapped it, and got out nearly a pint of dirty-looking fluid. There was no way of removing the tumour. I laid the tumour very freely open. She left the hospital a mere shadow of herself before her illness.

"For four years she enjoyed fairly good health. She was now quite stout, and married.

"In July 1887 I delivered her of a fine healthy child. She nurses her baby boy herself."

Dr. R. H. V.'s case.—The patient was married in April 1900.

"The first child, a boy, was born on August 25, 1901. In March 1902 her left ovary was removed for cystic degeneration. She has had four pregnancies since, all of which were boys."

The doctor writes of the case that, "if mental influence could do anything, she ought to have had girls, as she most devoutly wished for a girl each time."

Her left ovary, however, was diseased, and so removed; hence the subsequent children were from ova from the right ovary, and therefore were boys.

Dr. Amand Routh[1] reports a case of tubal pregnancy.

"Pregnancy in left tube; corpus luteum in left ovary. The right tube was normal; a nodule could be felt on the left tube. The left ovary and tube were removed."

The report on the specimen by *Mr. J. H. Targett* says:

"The specimen consists of the (left) Fallopian tube, ovary, and adjacent portion of the broad ligament. The ovary contains a recent corpus luteum. The histological evidence of gestation is thus assured."

It follows that this woman, who thus had her left tube and left ovary removed in May 1898, had only the right ovary remaining to produce ova. That this right ovary was functionally active is evident from the sequel, for Dr. Routh writes me that she afterwards "became pregnant and gave birth to a boy in April 1899."

[1] "Trans. Obstet. Soc.," 1898, p. 222.

Dr. Macnaughton-Jones[1] describes a case of pregnancy after removal of the left ovary and tube.

"In February 1903, at the operation, the sac of the left ovary was found about the size of an orange and full of blood; the cyst of the left ovary with the left tube was removed entire. Towards the end of 1895 menstruation ceased, and I found she was pregnant. She was delivered of a male child on May 31st, 1896."

Thus this woman with only the right ovary in her abdomen gave birth to a boy.

Dr. L. B. had the left ovary removed from a patient, and three years later she was delivered by him of a boy.

Mrs. B. G. had had disease of her left Fallopian tube, etc., for years, during which time she had given birth to two boys. The disease continued, till finally a pyosalpinx or abscess in the tube formed. The diseased left tube and ovary were therefore removed. Two years afterwards she gave birth to another boy, the ovum having necessarily come from the right ovary.

Dr. P.'s case.—Mrs. M. F. married in April 1902; she became pregnant during September 1902 in her left Fallopian tube.

She was admitted to hospital, and her pregnant left tube and left ovary were removed.

Less than two years afterwards, in August 1904, she was delivered of a living male child.

The right ovary, the only one remaining in her abdomen, had given rise to a boy.

Similarly if the right ovary be entirely removed, any ovum subsequently fertilised must come from the left ovary, and a girl will be born, and thus will support my theory.

Dr. McKerron[2] has a paper on "Obstruction of Labour by Ovarian Tumours in the Pelvis." Right ovariotomy, subsequent pregnancy, and birth of female child. The tumour was removed. It was a right ovarian dermoid. She subsequently became pregnant once more, having, of course, then only the left ovary in her body. She was delivered on January 15, 1897, of a living female child.

[1] "Diseases of Women," 1900, p. 667.
[2] "Trans. Obstet. Soc.," 1897, pp. 337 and 339.

After the right ovariotomy the left ovary must of necessity have supplied the ovum which was fertilised, hence a girl was born.

Mr. Alban Doran[1] describes a case of right tubal pregnancy. The right tube and right ovary were removed. "The left tube and left ovary were perfectly normal," and therefore were not removed. Mr. Doran has since informed me that he "removed the *whole* of the right ovary on December 2, 1899.

"The uterus was *not* pregnant at the time of the operation; the patient was confined of a girl in December 1900."

Thus having only the left ovary, the ovum fertilised therefrom produced a female child.

Mrs. D. C. had her right ovary and tube removed by Dr. J. Oliver. She has since been pregnant on two occasions, a female child being born *each* time.

I delivered her of her *second girl* in April 1903, having assured her it would be a girl directly she became pregnant.

Mrs. B. P. had three boys born. When the youngest was nearly ten years old an abdominal tumour developed. At the operation her right ovary was removed for a tumour in it. Subsequently a girl was born, just three years after the operation.

Her right ovary having been removed, she had only one ovary remaining in the abdomen, namely the left, and a female child was derived therefrom.

H. B. Mylvaganam,[2] in a case of advanced pregnancy and ovarian cyst, performed abdominal section, and tapped and removed a large cyst of the right ovary. He then performed Cæsarean section, and "a viable female fœtus about eight months old was removed."

In this case it was evident that the girl had come from the healthy left ovary, the right ovary being diseased and occupied by a "large thin-walled cyst containing smaller cysts," which had existed "for the past few years," and for which she had been tapped four times and fluid had been drawn out." The left ovarian origin of the ovum is evident.

[1] "Trans. Obstet. Soc.," 1900, p. 135.

[2] H. B. Mylvaganam, F.R.C.S., in "Lancet," July 29, 1911, p. 297.

The Effects of Bilateral Ovariotomy.—It seems difficult to realise that any other result than absolute sterility can possibly follow the removal by operation of both ovaries.

THERE ARE, HOWEVER, ON RECORD A DOZEN CASES OF PREGNANCY FOLLOWING THE SO-CALLED REMOVAL OF BOTH OVARIES.

It will of course be at once evident that the supposed removal was not complete, a portion of one or other ovary being allowed to remain in the abdomen. There is, as far as I can gather, no case on record of a portion of both ovaries being inadvertently allowed to remain and different-sexed twin-pregnancy following.

In one extreme case quoted by *Parvin*[1]—

"*Olshausen* performed, as he thought, ovariotomy; but the result being fatal, he found at the autopsy that *neither* ovary had been removed."

Complete removal, then, of all ovarian tissue from both sides absolutely stops ovulation, and therefore leads to permanent sterility; menstruation, too, is permanently arrested.

I do not propose here to go further into the question of the results of incomplete operations, which I have considered in Chapter XXI., beyond pointing out the fact that, as a small portion of an ovary can carry on its functions, the operation known as resection of an ovary has been introduced.

The Effects of Resection of an Ovary.—Resection of an ovary is an operation by which, in a partially diseased ovary, the diseased part only is removed, the healthy part being allowed to remain. This conservative operation is due to the appreciation of the fact that a very small piece even of an ovary is sufficient to ensure the production of fertilisable ova, so that pregnancy may follow the entire removal of one ovary and the partial removal or resection of its fellow. Hence it follows that resection of one ovary and entire removal of the other resembles incomplete bilateral ovariotomy in its results.

The actual effect as regards the sex of children born after resection of *one* ovary depends necessarily on whether the opposite ovary has been entirely removed or not.

[1] Parvin, "Science and Art of Obstetrics," 1895, 3rd ed. p. 107.

If *not* removed, the woman can have either sexed children, or "pigeon-paired" twins, because there is one complete ovary and part of the opposite one.

If the opposite ovary have been entirely removed, she can have but one sex of children, which will correspond to the ovary resected.

The following is a case in point, which very characteristically supports my theory:

Mrs. Stanley Boyd[1] operated on a patient and *entirely removed the right ovary*. She resected the left ovary, as a portion of it showed early cystic disease. The cystic portion was removed, and the healthy part of the left ovary was allowed to remain in the abdomen.

The patient subsequently became pregnant, and was duly delivered of a girl.

Necessarily the healthy remainder of the left ovary must have provided the ovum, and consequently the child born was a female.

Besides strikingly supporting my theory, this case also exemplifies very plainly a fact which many critics either cannot or will not realise—viz. that the complete removal of an ovarian tumour is not synonymous with the complete removal of all the ovarian tissue on the same side as the tumour.

One cannot but regret that writers so often fail to record of which ovary it is that a portion is healthy, and so allowed to remain in the abdomen; and also fail to record the sex of the child subsequently born.

From an interesting paper by *Mrs. S. Boyd*[2] it appears that probably 20 per cent. of women become pregnant after such operations.

[1] "British Medical Journal," "Conservative Surgery of Tubes and Ovaries," Sept. 15, 1900.

[2] Mrs. S. Boyd, "Journal of Obstetrics and Gynæcology," vol. iii., March 1903, p. 241.

CHAPTER XI

CASES OF PREGNANCY IN ABNORMAL UTERI WHICH PROVE THE THEORY

It has been pointed out in the chapter on Anatomy that the uterus in the human female is a single-cavity-containing organ formed by the fusion of the two ducts of Müller.

If these two tube-like ducts, from which the uterus is developed, do not properly coalesce, the uterus in the human female becomes double, and is known as a bi-cornuate uterus.

The diverging branches of the uterus are known as cornua or horns, a right and a left, and their cavities being more or less separated, the whole cavity comes to be somewhat Y-shaped, and thus it resembles the uterus of many of the mammalia. Cf. Fig. 4, p. 10.

Though the uterus be thus doubled, the number of ovaries and Fallopian tubes remain the normal, only one ovary and one tube being associated with each half of the uterus.

Pregnancy occurs in these as in normal uteri, and the child derived from the right ovary usually develops in the right cornu, and that from the left ovary in the left cornu; thus these cases confirm and prove the theory.

Dr. A. E. Giles,[1] in describing a case of complete double uterus, states that the right half of the woman's uterus had *never been pregnant*, the mouth of this right half of the womb being small, round, and virginal. The left half or cornu of the uterus *had* been pregnant. It was the larger of the two, and its mouth was opened and elongated transversely, showing a child had passed through it. She had given birth to one child only, a girl, which was alive. That is, the left side of a double uterus had brought forth a female child.

[1] Giles, "Trans. Obstet. Soc.," vol. xxxvii. 1895, p. 305.

Jurinka[1] describes a case, of which an abstract is given in the above journal, of double uterus. The left half was not pregnant.

"The cavity of the gravid right half contained an embryo of the male sex."

There is no mention of a corpus luteum, unfortunately, but the right side of a double uterus had brought forth a male child.

Thus these two cases strikingly confirm the theory.

Lusk[2] mentions that Professor Fordyce Barker had a case of "double uterus." "A mature living male child was born on July 10, and on September 22 following the mother gave birth to a full-term living girl." So that each half of a double uterus produced a full-time child of different sex, but which side contained which is, most unfortunately, not given.

Dr. M. Handfield-Jones,[3] in a case of double uterus, found the left side pregnant, and the corpus luteum in the left ovary, but no sex of the child was given.

Dr. Walls[4] described an unusual case where, from a double uterus, a male child was delivered. The placenta was attached in the right half of the uterus, and the greater part of the child was in the left half, its "head being in a cavity between the two cornua."

Possibly before labour set in it was entirely in the left horn; but the fact is evident that the male child first developed in the right half, as shown by the location of the placenta.

Hence this case is confirmatory also.

Ollivier[5] reported a case where a woman had been pregnant on six occasions, all in the left half of a double uterus. The "right half of the uterus was virginal, the left half larger and more developed."

Unfortunately, the sex of the children is not given.

[1] Jurinka, "Journal of Obstetrics and Gynæcology," vol. v., Feb. 1904, p. 173; and "Brit. Medical Journal," Epitome, Dec. 1903.
[2] "Science and Art of Midwifery," 1892, p. 231.
[3] "Trans. Obstet. Soc.," vol. xxix. 1887, p. 146.
[4] Dr. Walls, "Practitioner," Jan. 1903, p. 82.
[5] "Gazette Médicale de Paris," 1872, p. 163.

In some cases of double uterus, the two halves of the uterus are not equally developed.

In a case where the right half of the uterus had thus only partially developed, *Mr. J. H. Targett*[1] removed it and its contained child, which was a boy. That is, the right half of the uterus had brought forth a male child. The left half of the uterus was empty.

It is in these cases of double uterus that migration of the ovum most frequently takes place, for we find a fœtus in one cornu and the corpus luteum in the ovary of the other side. External migration of the ovum must necessarily occur in those cases where the two cornual cavities do not coalesce above a common cervix, but each ends in a separate cervix. There is no evidence to warrant a belief that a fertilised ovum can pass out of the cornu and cervix of one side into the single vagina, and thence pass through the other cervix into the cornu of the opposite side; certainly it cannot do so if the vagina is also doubled and distinct.

Dr. Lewers[2] showed a specimen consisting of pregnancy in

" the rudimentary left uterine cornu, with the left Fallopian tube and ovary attached to it. The ovary *does not* contain the corpus luteum, so that the case must have been an example of the external migration of the ovum from the opposite ovary " (the right).

The child was a boy.

Here is a case of a male child developing in the left rudimentary half of a uterus, and the left ovary proved *not* to have provided the ovum: a most convincing case. The right ovary was, of course, not examined, but remains in the abdomen.

A somewhat similar case is recorded by *Sir T. Rudolph Smith*[3] and *Dr. H. Williamson*. The specimen was " a dilated rudimentary left uterine cornu bearing a fœtus." The left ovary was *small* and normal. No mention of corpus luteum in it, as it was evidently not in it, because, owing to the fact that " the pedicle attaching the sac to the uterus was imperforate," the means by which the oösperm reached

[1] Targett, " Trans. Obstet. Soc.," vol. xlii. 1900, p. 276.
[2] " Trans. Obstet. Soc.," vol. xlvii. 1905, p. 113.
[3] " Journal of Obstetrics and Gynæcology," vol. iii. 1903, pp. 27-30.

this rudimentary cornual cavity must have been by external migration of the ovum.

The normal right tube and ovary remain in the abdomen, and the latter undoubtedly contains the corpus luteum.

Note that the left ovary is described as small, therefore not enlarged by the growth of a corpus luteum in it. In a private letter Sir Rudolph Smith tells me the child was a boy.

The ovum, I maintain, must have come from the right ovary, and the child was a male; it is a similar case to one published by *Howard Kelly*.

CHAPTER XII

THE CORPUS LUTEUM AS A SIGN OF PREGNANCY

PREGNANCY manifestly cannot occur without the provision of an ovum, so that ovulation precedes pregnancy.

The ovum is extruded by the bursting of a Graafian follicle. The ruptured follicle filled with blood is the first stage in the formation of a corpus luteum, hence ovulation is always followed by the formation of a corpus luteum.

The difference between the corpus luteum of menstruation and that of impregnation, or the "false" and the "true" corpus luteum, has already been pointed out to be one of size only; the larger size of the true corpus luteum being due to the increased congestion or blood supply incident to pregnancy.

Hence it follows that pregnancy is practically invariably shown by the presence of a true corpus luteum, and I have throughout looked upon the presence of a true corpus luteum as not only indicative of pregnancy, but as indicative of the ovary which provided the fertilised ovum.

As *Hirst*[1] says:

> "The true corpus luteum is of value as an indication of the ovary from which the impregnated ovule came."

But a large corpus luteum has been found in some instances where no pregnancy has existed.

In the great majority of such cases, where the uterus has not contained a fœtus, it has contained a growing myoma or fibroid tumour.

Two such cases are mentioned by *Sir J. Bland-Sutton*,[2] a myoma being present in each; while in a third instance

[1] Hirst, "Obstetrics," p. 63.

[2] Bland-Sutton, "Surgical Diseases of Ovaries," 1896, p. 18.

related by *Sir J. Bland-Sutton*,[1] not only was the ovary which contained the well-marked corpus luteum itself occupied by a large dermoid tumour, but the "uterus contained a large myoma which blocked up the pelvic cavity."

He therein also states he has seen several other instances in association with myomata; and other cases have been described by *Dr. Herman*[2] and *Dr. Popow*,[3] a fibroid being present in every case.

A placental polypus has also been known to act like a fibroid, and cause a subsequent menstrual corpus luteum to develop like one due to pregnancy.

Undoubtedly the presence in the uterus of a fibroid tumour and the irritation of its growth acting reflexly on the ovary similarly to what a fœtus does, cause the corpus luteum of menstruation to grow into a large or true corpus luteum indistinguishable from one due to pregnancy, or, as *Dr. Galabin*[4] expresses it—

"A fibroid causes a corpus luteum like that of pregnancy, owing to undue congestion."

One other cause of a "true" corpus luteum in women whose uterus contains no fœtus has been discovered in prostitutes, and *Dr. Popow*[5] has described such a case.

Here the life of drink and venery provides that irritation, stimulation, and "undue congestion," which would lead to the growth from the "false" to the "true" corpus luteum.

Some other cases are doubtless due to the occurrence of extra-uterine gestation, a tubal mole or abortion being overlooked, for the lately pregnant tube very quickly returns to its normal condition and appearance, and the fact that it had been pregnant is missed. *Dr. Cullingworth*[6] has exhibited and described a Fallopian tube which had within ten hours of its rupture, and extrusion of an early ovum, entirely resumed its normal size and appearance. Had it

[1] Bland-Sutton, "Trans. Obstet. Soc.," vol. xxxiv. 1892, p. 6.
[2] Herman, *Ibid.*, vol. xxxiv. 1892, p. 10.
[3] Popow, *Ibid.*, vol. xxiv. 1882, p. 100.
[4] Galabin, "Manual of Midwifery," 1900, p. 45.
[5] Popow, *loc. cit.*
[6] "Trans. Obstet. Soc.," vol. xlii. 1900, p. 129.

not been for the rent and the microscopic detection of chorionic villi, it would have been impossible to recognize it as having recently contained an ovum. See *Sir J. Bland-Sutton's*[1] diagram of a normal-looking tube after recent complete tubal abortion: there is a well-marked corpus

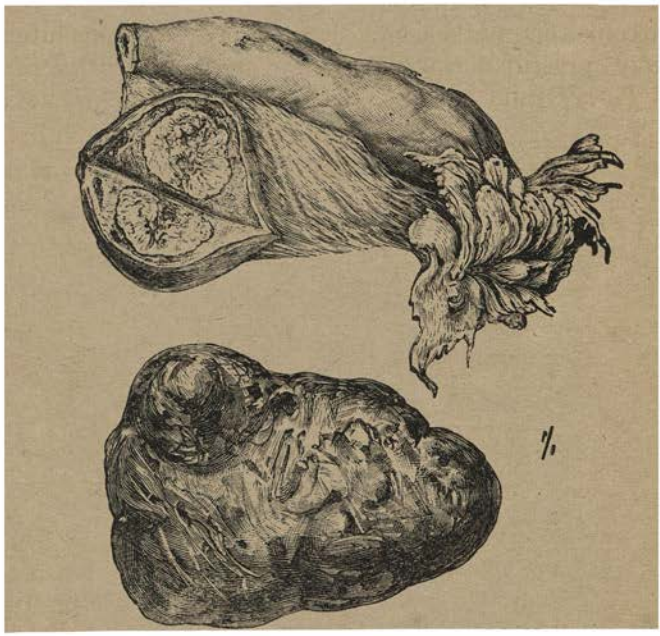


FIG. 14.—A RECENTLY PREGNANT FALLOPIAN TUBE, WHICH HAS ABORTED THE LARGE MOLE SHOWN. (After Bland-Sutton.)

There is a well-marked corpus luteum displayed in the opened ovary.

luteum in the ovary; the uterus would of course contain no fœtus in this case.

A few cases of pregnancy and no corpus luteum have been stated to have been seen. The rate, however, at which a corpus luteum disappears occasionally varies; thus *W. Williams*[2] says:

"In young women, in whom the circulation is active, the degenerated lutein cells are rapidly absorbed, so that in a short time the corpus luteum becomes replaced by a newly formed connective

1 Bland-Sutton, "Diseases of Women," 1904, p. 290.
2 Williams. *op. cit.*, p. 68.

tissue, which corresponds closely in appearance to the surrounding ovarian stroma. But in more advanced life, when the ovarian circulation has become impaired, absorption goes on less rapidly."

It is probable, therefore, that in these cases the corpus luteum has become absorbed more rapidly than usual, and so has not been recognised.

We come then to the conclusion that a true corpus luteum is always present during pregnancy, and is indicative of it, or as *Parry*[1] puts it—

"The presence (of the corpus luteum in pregnancy) is the rule, its absence is the exception, especially in the early months of gestation."

[1] Parry, "Ectopic Pregnancy."

CHAPTER XIII

THE MIGRATION OR TRANSMIGRATION OF THE OVUM

AMONG the cases which might at first sight have appeared to disprove my theory, are those where the corpus luteum is found in one ovary, while the fœtus is found in the opposite Fallopian tube; or the opposite cornu, if the human uterus happen to be of the mammalian or bifid form. In these cases, *the sex of the fœtus corresponds to the ovary in which the corpus luteum is found.*

Bischoff, in 1844, was the first to call attention to the fact that occasionally, in animals with a bicornuate or bifid uterus, the corpus luteum may be in one ovary and the embryo in the opposite cornu or branch of the uterus.

This he ascribed to a migration of the ovum, and alleged that the fertilised ovum had come from the ovary in which the corpus luteum was found, and had made its way into the cornu of the opposite side instead of attaching itself to the wall of the cornu corresponding to the ovary from which it was derived. This explanation is certainly the correct one.

Kussmaul first described its occurrence in woman, especially in tubal pregnancies, and pointed out that it might arise either (*a*) owing to the ovum passing from one ovary across the pelvic cavity along the peritoneal surfaces of the intestines, into the external opening of the opposite tube, which he called the External Migration of the ovum, or (*b*) from its passing down one tube, then across the uterine cavity and so up into the opposite tube, which variety he called Internal Migration of the ovum.

Hirst[1] says:

"It is possible for the ovum, after its discharge from the ovary, to be taken up by the fimbriated extremity of the opposite tube—an external transmigration of the ovum.

[1] Hirst, "Obstetrics," 1900, p. 62.

"It is also possible for the ovum to traverse one tube and the uterine cavity, and to enter the uterine ostium of the opposite tube, —an internal transmigration of the ovum."

Both forms of migration of the ovum are credited by, among others, *Dr. Herman*,[1] who said:

"There was abundant evidence in support of the external migration of the ovum, and some evidence in favour of internal migration."

W. Williams[2] says external migration "is probably by no means rare," and further points out that proof of internal migration is very difficult to bring forward, though "its theoretical possibility cannot be denied."

It will be necessary to discuss each event, to show that the occurrence is rather proof of the theory than otherwise.

The external migration of the ovum, or transperitoneal migration, as *Dr. Galabin* describes it, means that an ovum reaches the opposite tube without passing through the uterus. It was described by *Barnes*[3] as Extra-Uterine Transmigration of the ovum.

In the normal condition of the tubes and ovaries, the great majority of the ova, after leaving the ovary, enter the nearer or corresponding tube; but, as *Sir J. Bland-Sutton*[4] says:

"Probably a certain number of ova fail to enter the Fallopian tube, and are lost in the peritoneal cavity."

But not all are lost because they miss the nearer tube, for, falling into the general peritoneal cavity, they are caught up in the thin capillary layer of serous fluid which bathes the surfaces of the organs and intestines. This fluid acts by keeping their surfaces moist, and by thus preventing them from drying or adhering to each other, it enables one coil of intestine to readily pass over another.

The peristaltic movements of the intestines, as well as the natural changes in posture of the woman, must help to carry small floating bodies like ova along the moist surfaces of the pelvic viscera. In this thin layer of fluid a current exists, due to the wavy motion of the cilia or hair-

1 Herman, "Trans. Obstet. Soc.," vol. xlvi. p. 103.
2 Whitridge Williams, "Obstetrics," pp. 79, 80.
3 Barnes, "Midwifery," 1878, p. 346.
4 Bland-Sutton and Giles, "Diseases of Women," 1900, p. 18.

like processes lining the fimbriated ends of the Fallopian tubes, and this current runs towards the large open abdominal end of the tubes, and so down the tubes into the uterine cavity.

But in addition to the peritoneal fluid or serum, we also have the follicle fluid (Liquor Folliculi), together with a little blood, which is discharged when the ovum escapes by the bursting of the ovarian or Graafian follicle. This must help also to float the ovum onwards towards one or other tubal end.

As *W. Williams*[1] says:

"The correctness of this view has been substantiated by the experimental work of *Pinner*, *Jani* and *Lode*. The former injected cinnabar, and the latter ova of ascarides, into the peritoneal cavity of animals, and found that they made their way to the pelvis, where they were taken up by the tubes, through which they were carried to the uterus, and eventually appeared in the vagina."

As was recently pointed out by *Dr. R. Boxall*,[2] the peritoneal cavity is, during life, with the abdomen unopened, a cavity in name only, the pelvic organs and intestines being in close apposition. It was therefore—

"quite easy to imagine how the ovum, floating about like a drop of oil, might readily find its way from one ovary to the abdominal ostium of the Fallopian tube of the opposite side, and so be swallowed";

while *Dr. Cullingworth*,[3] after pointing out that not only were the ovaries and abdominal ostia of the tubes closer together than was generally supposed, but were often in actual contact, said:

"Writers spoke of the ovum travelling across the peritoneal cavity, and conveyed the impression of a long and almost inconceivable journey, whereas the ovum might merely have to step in next door."

Harrison Cripps and *H. Williamson*[4] reported a case of tubal gestation with external migration of the ovum.

Howard Kelly has reported a case of removal of the right

[1] Whitridge Williams, "Obstetrics," 1903, p. 79
[2] "Trans. Obstet. Soc.," 1904, vol. xlvi. p. 104.
[3] *Loc. cit.*, p. 105.
[4] "Brit. Med. Journ.," March, 1904.

Fallopian tube and the left ovary. The patient subsequently conceived intra-uterine, and bore a healthy child—

"The ovum necessarily passing from the right ovary up the left uterine tube, and so into the uterus."

Küstner has reported a similar case.

I have thus shown how external migration may occur with the tubes and ovaries normally situated or stationary; it must evidently more readily occur if the two tubes and ovaries should be misplaced, or in any way approximated to the same side.

The tubes are, it is generally admitted, very freely movable, and there can be no doubt that when a woman is lying on one side, gravity may help the *upper* tube to cross over or fall down towards the side she lies on, and thus cross over the body of the uterus, so that the tube's expanded abdominal opening is nearer to the opposite, or lower-in-the-pelvis, ovary; and thus it may come to pass that an ovum has almost a choice of tubes to enter. This used to be described as the tube of one side grasping the opposite ovary. That the tube ever actually grasped the ovary was incorrect, but it grasped an ovum, for by approximating its open end to the ovary of the opposite side, it is only reasonable to suppose it occasionally secured, grasped, or received an ovum from that opposite-sided ovary.

Dr. Byron Robinson[1] writes that, owing to its "wide range of movement, the abdominal or ampullar end of the tube is capable of securing ova from either ovary."

A case is described by *Alban Doran*[2] where the dilated right *pregnant* tube "had fallen behind the uterus and developed towards the left side."

He removed the right tube and the right ovary, which contained no corpus luteum. The left tube and ovary, being normal, were not touched; as the right ovary contained *no* corpus luteum, the sign of ovulation, the ovum must have come from the opposite left ovary, and got into the right tube, which had become approximated to the left ovary—that is, it migrated, or entered the opposite tube.

[1] Dr. Byron Robinson, "Anatomy of the Oviduct," Feb. 1903.
[2] Doran, "Trans. Obstet. Soc.," 1900, p. 135.

This, which may be described as normal or temporary approximation of the tubes to one side, occasionally becomes permanent and pathological through adhesions binding both tubes down to one side.

Sir J. Bland-Sutton[1] has described and figured such a case; both tubes are lying attached to the left side of the uterus, so that the right tube is more likely to receive a left ovum than one from its own, or right ovary.

In other cases the tube of one side may be of *extra or abnormal length*, and this, in conjunction with its mobility, must increase the probability of its open end occasionally falling in close proximity to the ovary of the opposite side, and thus securing an ovum from it.

Dr. T. Wilson[2] describes a case of *extra long tube*, where, instead of the average length of four inches, "the left Fallopian tube runs longitudinally to the left for *nine* inches."

Occasionally, too, we find, as in cases by *Dr. Herman*[3] and *Sir J. Bland-Sutton*,[4] a tube is misplaced, and fixed up to the *top of the uterus*, and in this position, therefore, it is as likely to receive an ovum from the opposite ovary as from its own ovary.

In other cases both tubes and ovaries are *displaced backwards* behind the uterus, hence it becomes equally possible for a tube to receive an ovum from the opposite ovary as from its own ovary. Thus *Howard Kelly*[5] says:

"I have repeatedly found both tubes and ovaries lying low down behind the uterus, with the fimbriated extremity of the right tube in contact with the left ovary and *vice versa*."

Dr. Giles[6] describes such a case. The pregnancy was in the left tube, corpus luteum in right ovary, none in left ovary.

Both tubes and both ovaries were bent backwards behind the uterus, so that the receipt of the ovum by the left tube from the right ovary is not difficult to realise.

[1] Bland-Sutton, "Trans. Obstet. Soc.," 1892, pp. 9 and 10.
[2] Wilson, *Ibid.*, 1897, p. 172.
[3] Herman, *Ibid.*, 1897, p. 135.
[4] Bland-Sutton, *Ibid.*, 1897, p. 164.
[5] Kelly, "Operative Gynæcology," 2nd ed., vol. ii., p. 449, 1906.
[6] Giles, "Trans. Obstet. Soc.," 1897, p. 244.

I have thus shown that we may have—

Extra long tubes.
Displaced tubes, so that both approximate one ovary, either both tubes backwards, or to the same side of uterus, or to the top of uterus.

But besides these misplacements of the tubes, we may also have the ovaries displaced—so much so that one tube may almost have a choice of ovaries to secure an ovum from.

Dr. R. Pollock[1] says:

"In both ovaries there was a dermoid tumour; the left ovary was lying over the right in the right iliac fossa, and was fixed there by a piece of omentum."

Glockner[2] reported a case of right cornual pregnancy, no corpus luteum in right ovary, but in the left, thus supporting migration of ovum.

There is also some evidence of the occasional transperitoneal migration of the spermatozoa as well as of the ova.

We can therefore take it as settled that External Migration of the ovum *does* take place in mankind, and the probability of its occurrence is increased by the frequent misplacements of one tube, or ovary even, as well as by the temporary physiological changes of relative positions due to the postural changes in the woman.

Internal Migration of the ovum is the passage of an ovum from one tube *via* the uterine cavity to the other tube.

It is much more difficult to prove that this internal migration actually takes place: that it is possible and feasible is evident from these facts. The journey for the ovum from one uterine ostium of the tube, across the uterine cavity, to the other uterine ostium, is not a long journey; for the uterine cavity transversely (the uterus not being at the time enlarged, because it is not pregnant) has a lesser diameter than the vertical one, which latter constitutes the usual length of journey made by the ovum on its passage out of the uterus, and in placenta prævia cases;

[1] Pollock, "Trans. Obstet. Soc.," 1898, p. 120.
[2] Glockner, "Journ. Obst. and Gynec.," vol. i. 1902, p. 99.

so that if it is capable of making the longer one, it should not be unusual for it to sometimes make the shorter or transverse journey.

Richet (quoted by *Hart* and *Barbour*[1]) gives the following as the measurements:

	Virgin.	Multipara.
Vertical diameter of cavity of uterus	1·80 in.	2·44 in.
Transverse ,, ,, ,,	·60 ,,	1·24 ,,

—that is to say, the journey *down* the uterus is three times as far in the virgin as *across* the uterus, while it is twice as far in a multipara. Placenta prævia cases prove the complete vertical journey of the ovum.

Another point which is in favour of the occasional internal migration of the ovum is that a woman lying in bed on her side makes the transverse diameter of her uterine cavity (or shorter journey) into, for the time being, a vertical diameter, so that gravity may help the passage of the ovum from one uterine Fallopian opening to the other.

Kussmaul, quoted by *Playfair*,[2] thinks the muscular contractions of the uterus may work the ovum across.

There are, then, two explanations of those cases where a male fœtus, say, is found in the left Fallopian tube or left horn of the uterus, the corpus luteum being in the right ovary.

They are the External and Internal Migration of the Ovum, both of which evidently occur, though the external migration is more easily proved.

Owing to the two horns of the uterus freely joining each other in the body of the uterus in the mammalia, forming the uterus bicornis unicollis, internal migration of the ovum is very often seen, the fertilised ova being washed down one or other cornu, and attaching themselves as often as not in the opposite horn. This I have known to occur very often in sheep, cats, and rabbits.

We therefore see that the presence of a male fœtus in the left Fallopian tube in no way disproves my theory, *nor* do females in the right tube, or the right uterine cornu in the mammalia.

[1] Hart and Barbour, "Manual of Gynæcology," 2nd ed. p. 16.
[2] Playfair, *op. cit.*, p. 194.

CHAPTER XIV

PREGNANCY IN THE MAMMALIA

PREGNANCY in mammals differs from pregnancy in the human female from the fact that in most of the mammalia the pregnancy is a multiple one.

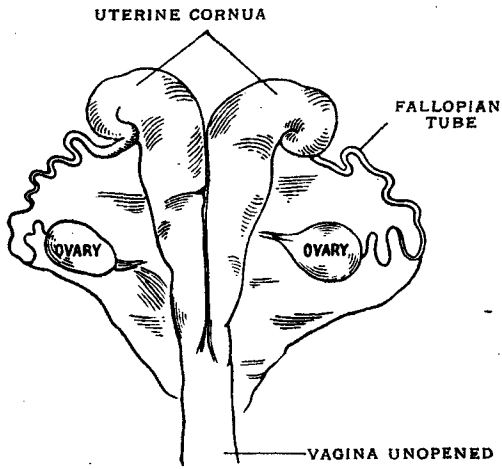


FIG. 15.—UTERUS OF A SHEEP, DORSAL ASPECT: UNOPENED. (From nature.)

The chief difference, however, is due to the two anatomical facts that in mammals—

(*a*) The uterus is not a single-cavity-containing organ, but is practically bifid. It is said to be bicornuate—*i.e.* to possess two horns or arm-like processes. These join each other to form a more or less Y-shaped cavity.

Into the divergent extremities of the two cornua the Fallopian tubes, which are exceedingly small in comparison to the cornua, open.

The portion of the uterus formed by the coalesced ends of the two cornua forms the body, and terminates in the neck or cervix of the uterus.

(*b*) The uterus so lies in the mammalian abdominal cavity that when the animal is standing on all four feet the uterus lies parallel to the spinal column—*i.e.* is horizon'al—with, as a rule, the tubal ends of the cornua at a slightly lower

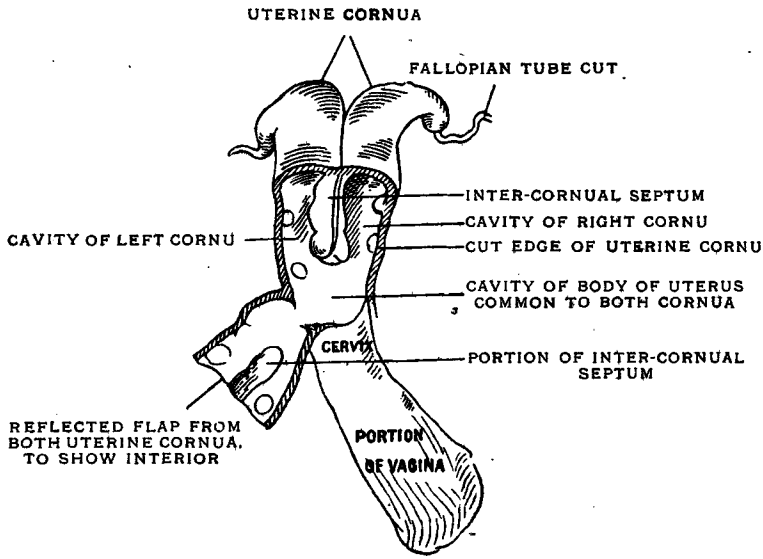

UTERINE CORNUA
FALLOPIAN TUBE CUT
INTER-CORNUAL SEPTUM
CAVITY OF RIGHT CORNU
CAVITY OF LEFT CORNU
CUT EDGE OF UTERINE CORNU
CAVITY OF BODY OF UTERUS COMMON TO BOTH CORNUA
CERVIX
PORTION OF INTER-CORNUAL SEPTUM
REFLECTED FLAP FROM BOTH UTERINE CORNUA, TO SHOW INTERIOR
PORTION OF VAGINA

FIG. 15A.—UTERUS OF A SHEEP: OPENED. (From nature.)

level in the abdomen than the cervical or vaginal end; in fact, as *Arthur Johnstone,* of Cincinnati, puts it:

"The os uteri of the horizontal animal points upwards; the other end of the uterus points downwards."

It will thus be seen that a great difficulty would have occurred in emptying the uterus had the mammalia menstruated regularly.

The erect posture of woman, with the mouth of her womb in the most dependent position, must facilitate drainage away of the menstrual discharge; so that only vertical animals really menstruate.

The horizontal or mammalian uterus, too, is very soft and very readily bent, and does not easily spring back into position, as, owing to its hardness and elasticity, does the human uterus.

Physiologically, too, there is the difference that in the mammalia coition in the natural state practically always ends in pregnancy; sexual congress is only permitted by the female at those times when pregnancy will result—*i.e.* only when ova are already provided will the female permit insemination.

The occasional non-occurrence of pregnancy in the domesticated mammalia—*e.g.* mares, cows, etc.—when put to the male is due to the choosing of the day for sexual congress by the ignorant groom or herdsman, rather than its being left to the female to gratify her desire when she pleases, and when she instinctively knows that pregnancy will result. Among the mammalia, heat, rut, or œstrus is the external sign that ova are matured, and ready for impregnation.

Farre says:

"In the mammalia the periods of emission of ova from the ovary and their passage down the Fallopian tube are undoubtedly coincident with œstrus or rut. It is only on these occasions that the female manifests an instinctive desire for copulation. She is then said to be in heat. The condition is of brief duration; but whatever be its duration, it is the only period during which the female can be impregnated."

Having been fertilised, the ova or oösperms travel down their respective tubes (for in the polytocous mammalia—*i.e.* those which bear many young—both ovaries ovulate at the same time) and thus reach their respective cornua, where they usually attach themselves and develop; others travel farther, even into the opposite cornu, and develop there.

We are quite ignorant as to what determines the site of attachment of the fertilised ovum. Probably movements of the fluid in the uterine cavity are largely instrumental in causing the fertilised ovum to be carried to a distance before attaching itself, aided by changes in the posture of the animal. And we are not in a position to deny to the fertilised ovum some power of movement, or even of site selection.

Proof that the fertilised ova on arrival in the uterus travel some distance before being attached to the uterine wall is derived from the fact, as *Bischoff* pointed out long ago, of the occurrence of the fœtus, especially in cases of single pregnancy, in the opposite horn of the uterus to the corpus-luteum-bearing ovary.

This necessitates a journey for the oösperm down its corresponding cornu into the body of the uterus, and thence into the opposite cornu. *Garrigues*[1] says:

"In animals it has been proved that an ovum can migrate from one horn of a bicornuate uterus to the other."

Another explanation of this occurrence, especially in cases where the cornua do not freely intercommunicate, is furnished in the chapter on the Migration of the Ovum.

However many ova are fertilised, a corresponding number of corpora lutea will be found in the two ovaries together, and they will equal the number of fœtuses found present in the two cornua.

This was pointed out years ago by *Abernethy*,[2] who said:

"If in any animal—in a virgin rabbit, for instance, after she had taken the buck—you find four or five young ones, you would find four or five corpora lutea."

I have satisfied myself of the correctness of this in different animals—*e.g.* cows, sheep, pigs, rats, mice, cats, and rabbits. In a large tame pregnant rabbit I examined there was the unusual number of fourteen young rabbits in the two cornua, and there was a corresponding number of corpora lutea—viz. six corpora lutea in the right ovary and eight corpora lutea in the left ovary.

That the body of the mammalian uterus is not the usual site of fertilisation is evident from the presence of living spermatozoa not only *in* the Fallopian tubes, but even *on the surface* of the ovaries shortly after insemination.

I have made numerous observations of the sexes of the young in the two cornua, and these confirm the opinion that

[1] Garrigues, "Obstetrics," 1902, p. 13.

[2] Abernethy, "Lectures on Anatomy, Surgery, and Pathology," 1828, p. 422.

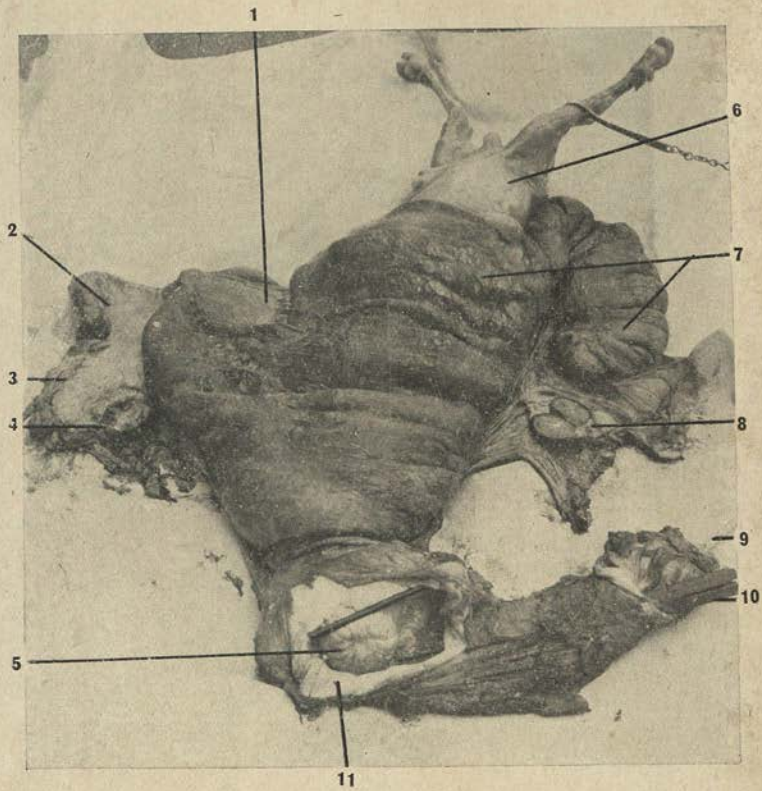


FIG. 16.—PREGNANT UTERUS OF A COW, SEEN FROM THE DORSAL ASPECT.

From a photograph of the Author's specimen.

1. Inter-cornual Fold and Sulcus. 2. Left Cornu of Uterus: not pregnant. 3. Left Fallopian Tube. 4. Left Ovary opened: no Corpus Luteum therein. 5. Cervix Uteri plugged with Mucus. 6. Male Calf partly extracted from the Right Cornu. 7. Right Cornu of Uterus: pregnant. 8. Right Ovary opened, showing large bisected Corpus Luteum. 9. Sound passed into Bladder. 10. Rod passed along Vagina up to the Cervix. 11. Vagina opened, showing the Cervix.

To face page 101.]

fertilisation takes place in the tubes, and the fertilised ova often wander widely before attaching themselves to the cornual wall and developing.

Thus in the *monotocous* animal, though it is most usual to find the young animal in the cornu corresponding to the corpus-luteum-containing ovary—*i.e.* the ovary which yielded the ovum that was fertilised—this is not always the case, as I shall shortly show. The opposite or non-pregnant cornu undergoes sympathetic hypertrophy, and a decidua forms in its interior.

Early in March 1902 I opened the pregnant uterus of a cow, usually a *monotocous* animal, though not always. There was *no* corpus luteum in the left ovary; there was a large *typical corpus luteum* in the right ovary, so I foretold a *bull* calf before I opened the actual uterus. The left cornu was not pregnant; the right cornu was occupied by a male or bull calf (see Fig. 16). The left cornu could be easily emptied of its fluid contents, etc., *via* the right cornu, showing the very free communication between the cornua.

I have also found the same occur on the other side in other cows, a female calf in the left cornu being found with the corpus luteum in the left ovary. I have found the same thing, too, in sheep.

In other cases, as I have said, the fœtal animal is in the opposite cornu to the corpus luteum, showing, in those cases where the cornu communicates, a journey down one cornu through the cervical portion of the uterus and so into the opposite cornu.

Thus in a sheep I have found a female lamb in the right cornu, with the only corpus luteum in the left ovary, and I have seen many similar cases in cows.

This condition of fœtus in one horn and corpus luteum in the opposite ovary occurs also in women, if the uterus be double or bicornuate, as in the following case:

Dr. J. R. Ratcliffe[1] reports a case of pregnant uterus bicornis.

"The left horn contained the fœtus. The right ovary (that on the opposite side to the pregnant horn) showed a true corpus luteum; none in the left ovary. The cervix was short and broad, only a quarter of an inch deep. The os externum is single."

[1] "Trans. Obstet. Soc.," 1892, vol. xxxiv. p. 469.

33243

The sex of the fœtus, which was between the second and third month of gestation, is not given.

The committee appointed to report on this specimen say:

"The ovum from the right ovary may have been washed up the left cornu just as it left the right cornu immediately above the os externum, but from the shallowness of the os this seems hardly probable."

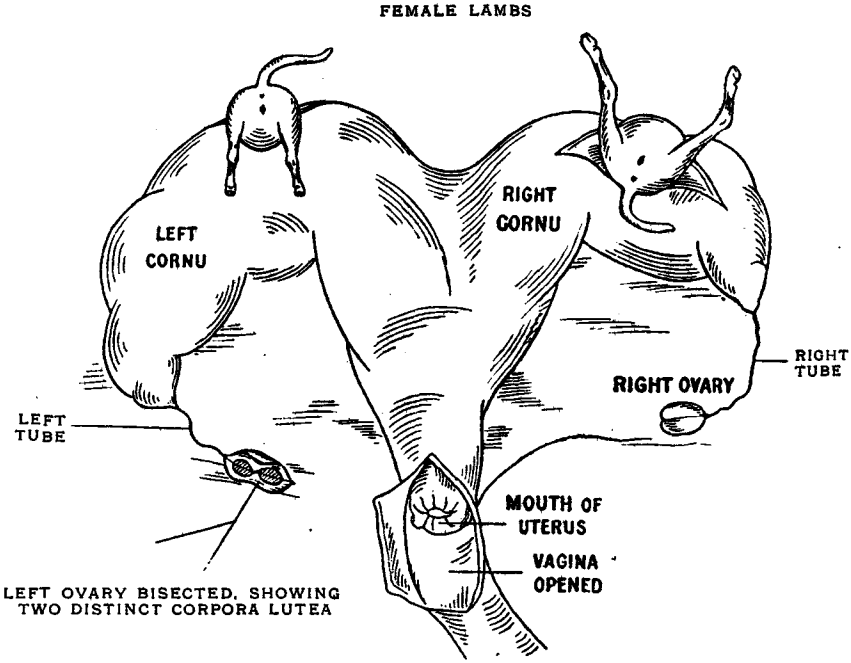


FIG. 17.—THE PREGNANT UTERUS OF A SHEEP, DORSAL VIEW. (Original drawing from nature.)

There is no corpus luteum in the right ovary; both uterine cornua are pregnant with a female lamb, and the left ovary contains two well-marked distinct corpora lutea, because it had provided both ova.

Why this shallow cervix, which was *a quarter of an inch deep*, should be thought an obstacle to an ovum of at most one hundredth of an inch diameter I cannot understand; the more so when we recall that it has already travelled down the Fallopian tube, whose diameter is infinitely less than a quarter of an inch, the depth of the cervix.

In the polytocous animals, or those which bear multiple offspring, we find that one cornu is very rarely empty if there be more than one embryo—that is, it is rare to find two or more fœtuses in one cornu and none in the opposite cornu.

If an animal have only two fœtuses in the uterus, one will usually occupy each cornu regardless of its sex; thus in a pregnant sheep I opened, I found the right ovary small, with no corpus luteum. The left ovary contained *two quite distinct* threepenny-piece-sized corpora lutea; though, as both horns were manifestly pregnant, I diagnosed before opening them a female lamb in each horn, and such they turned out to be when I slit them open.

I may add that there could be no question as to the sex, for they were covered in wool and so sufficiently developed to be able to tell by inspection; further, in most cases I opened the fœtuses and found the uterus, etc., or else the male organs.

In another sheep I found a male lamb in the right cornu and a female in the left, with a corpus luteum in each ovary.

In those animals, such as pigs, cats, rabbits, mice, which I have examined, whose offspring are truly multiple, the fœtuses are mixed up in the two cornua; but, as I have before pointed out, the ovaries contain between them a corresponding number of corpora lutea, both individually as regards sex and collectively as regards numbers.

Thus, in a pregnant cat there were four kittens, three females and one male; three corpora lutea in left ovary, one in the right ovary. They were lodged thus: two females in the left cornu, and one female and one male in the right.

In February 1902 I examined the young pigs in a sow's cornua, and found that, like the young of cats, rabbits, mice, etc., they are mixed as regards sex in the cornua.

From some experimental operations by *Prof. Leonard Doncaster*[1] on one of the rodentia—to wit, the multiple offspring bearing rat—it would appear that removal of one of her ovaries does not prevent a rat having young of both sexes. We have, however, no evidence that what occurs in the polytocous animals—especially these members of

[1] L. Doncaster, "Journal of Genetics," Nov. 1910.

the mammalia whose chief characteristic is their small size and prolificacy—must equally apply to monotocous woman. It is to be regretted the operation was not tried on one of the monotocous anthropoid apes.

Sir William Gowers has said in somewhat similar circumstances, "I do question an inference from guinea-pigs to men," as the writer does from rats to women. It is certainly a "far cry" from rats to women.

Among the specimens at the Royal College of Surgeons Museum the following show the way in which the prospective family is distributed in the cornua:

Specimen No. 3576.—Pregnant hedgehog: four fœtuses in right cornu, two in the left cornu.

Specimen No. 3566A.—Pregnant cat: two fœtuses in each uterine horn.

Specimen No. 3574.—Pregnant mole: three fœtuses in right, two in the left cornu.

Specimen No. 3469A.—Pregnant mouse: four fœtuses in each uterine cornu.

CHAPTER XV

WHY MORE BOYS ARE BORN THAN GIRLS

THOUGH there is no uniform proportion or numerical relation between the numbers of male and female children born to any two parents, *i.e.* in any one individual family, yet there is a very definite or normal numerical relation between the sexes at birth on taking the average of a country or several countries, the proportion being 106 male to 100 female children.

That this excess of male births is not accidental is evident by its universality.

As *Havelock Ellis*[1] says:

> "There are more boys than girls born among the Germans, French, English, and most civilised European races";

the slight variation in the proportions as given for the different countries not affecting the average proportion of 106 males to 100 females for all countries. The proportion is reputed to be in excess of these figures in those countries only—*e.g.* Spain, Roumania, Greece—where we should least expect birth certification and registration to be carefully and accurately carried out. This fact of the excess of male births over female births has been noticed and recorded for over two hundred years, so that its explanation must apply to that time also.

Why it is imperative that Nature should produce more boys than girls, is evidently due to the necessity that exists to compensate for the greater mortality of males.

This excessive male mortality, as we shall presently see, does not only occur at birth.

At birth the difficulties and dangers of parturition, and the consequent higher fœtal mortality, are increased by

[1] H. Ellis, "Man and Woman," 1904, p. 429.

the larger size and greater weight of the male fœtus compared to the female.

This applies not only to the boy's head, which, as a rule, is larger than a girl's, but usually to the whole body also, which necessarily undergoes greater compression in its passage through the genital canal; hence we find that the proportion of still-born boys is very much larger than that of still-born girls, the ratio being 138 still-born boys to 100 still-born girls. So that we have not only more living males born than females, but also a still larger proportion of dead full-time males to dead females. Abortions and premature births are also more often males than females, so that male conceptions exceed female conceptions, the ratio being about 110 male conceptions to 100 female.

Even after birth there is, especially during the first year of life, a much greater liability for the male infant to die—so much so that although, as we have seen, more boys are born than girls, the proportions are reduced to almost even terms by the end of the first year, owing to this greater male mortality.

Drs. Pinard and *Magnan* found, from the examination of over 52,000 confinements in the Clinique Baudelocque, that during *gestation* the mortality among boys was scarcely in excess of that of girls—viz., 618 boys to 611 girls. So that it is only during and after birth that more boys die, the evident penalty of increased size and weight, and the consequential compression.

During the first four years of life, in a gradually diminishing degree, the mortality among males still exceeds that among females; and this is the more remarkable when we recall that the management of the two sexes does not materially differ—they are dressed practically identically, and receive the same food.

Dr. Harry Campbell[1] states that the proportion of male deaths to female for the first five years of life is 69·5 male to 59·7 female per thousand. He ascribes it to "an innate tenacity of life on the part of the female." *Dr. C. W. Saleeby* says it is "the inherent vitality of woman which is

[1] H. Campbell, "Differences in the Nervous Organisation of Man and Woman," 1891, pp. 123–5.

superior to man's," and this, he points out, is a provision by Nature for the strain and risks of maternity. For some interesting particulars of this higher male mortality see also *Havelock Ellis*, "Man and Woman," chap. xvii., 4th ed., 1904.

The environment of adult men and women differs considerably; the woman's life is passed essentially within doors, the man's is more out of doors, and this very condition of life and work in the open is responsible for some of the deaths to which women are not so liable.

Lads and men, both in their pleasures and in their occupations, run many risks, and meet with not only fatal accidents, but with fatal illnesses also, and thus help to swell the adult male mortality.

One cannot, however, fail to agree with *Dr. Harry Campbell*[1] that—

"The part played by an unfavourable environment in causing the proportionately greater mortality of the male sex has been much exaggerated."

When, therefore, to the greater male *infantile* mortality we add the greater *adult* male mortality, it becomes abundantly evident that it was essential for Nature to produce more boys than girls to counteract the greater male mortality.

The greater male birth-rate is, however, more than counterbalanced by the greater male mortality, so that among adults the number of living females exceeds the males. In 1901 over eighteen thousand more males than females were born in England and Wales, but over twenty thousand fewer females than males died during the same time. So great has become this excess of women over men that the proportion now stands at 107 living women to 100 men, or a total majority in these islands of 1,082,000 women up to the year 1901.

Having considered the reasons *why* more boys should be born than girls, it remains to see *how* this excess of male births over the female is brought about.

[1] H. Campbell, *op. cit.*, p. 122.

How, then, does Nature insure the production of more boys than girls?

This simple-looking question has always been one of the most difficult ones to explain by any of the theories hitherto put forward to elucidate the cause of sex, and the means by which this excess of male births is brought about has evaded all theorists. It can be readily explained by the theory I set forth.

It is solved by the evident fact that in order to produce more males, or boys, it will first be necessary to provide more male ova; but, as I have already shown, the male ova come only from the right ovary, hence it is essential to produce more right-sided than left-sided ova. This, then, is brought about by increasing the area of the right ovary as compared to the left, so that more ova are produced by the larger right or male ovary than by the opposite or smaller left ovary.

That the ovaries are not usually the same size I have already mentioned in the chapter on their anatomy, the right ovary being a little larger than the left.

This actual anatomical fact has been very slowly recognised by British writers, for unfortunately, in discussing the anatomy of the ovaries, they are generally spoken of in the singular, and their respective size is not given.

That the right ovary is the larger of the two ovaries is definitely stated by the following authors:

William Anderson[1] says, "The right (ovary) is usually a little larger than the left."

Clarence Webster[2] says, "The right ovary is larger than the left."

George A. Piersol[3]: "The right ovary being commonly slightly heavier and larger than the left ovary."

Parvin[4]: "The right ovary is usually somewhat larger than the left."

[1] Anderson in "Henry Morris' Treatise on Human Anatomy," 3rd ed. 1902, p. 1106.

[2] C. Webster, "Diseases of Women," 1898.

[3] Piersol in Norris and Dickinson, *op. cit.*, p. 57.

[4] Parvin, "Science and Art of Obstetrics," 1895, 3rd ed., p. 76.

Bonamy and Beau[1] show in Fig. 1, Plate 72, in a young virgin woman who died in the *intermenstrual* period, the right ovary considerably larger than the left.

Berry Hart[2] shows the right ovary about a third larger than the left.

In order to further satisfy myself of the correctness of this fact, I have inspected the specimens at the Royal College of Surgeons Museum, and find that specimens Nos. 293, 296, 297, in the anatomical series, and specimens Nos. 2818, 3619A in the physiological series, prove it to be true; but one specimen, No. 294, of the "Uterus and appendages from an old woman who had borne children," shows the left ovary, a trifle only, larger than the right.

In several autopsies I have made in general practice on women in the reproductive period of life I have found the right ovary larger than the left, and the increased size was not due to the increased size of an ovary incidental to the presence of the menstrual period, nor was it due to the presence of a corpus luteum of pregnancy.

Further, I have noted the relative size of the ovaries while watching others perform such operations as hysteropexy for conditions which do not imply disease of the ovaries themselves. These cases have also proved that the right ovary is the larger of the two.

Granting, therefore, that the right ovary is slightly larger than the left ovary, we can correctly attribute the fact that more boys are born than girls to this other fact—that the area of ovarian tissue capable of producing right-sided or male ova is greater in extent than is the left ovary, and thus does Nature secure the production of more male ova than female ova.

That this is the correct solution of this vexed question, why more boys are born than girls, is confirmed by the equally convincing fact that twin boys are similarly much more numerous than twin girls; for manifestly the probability of providing two distinct ova at the same time by the right

[1] Bonamy and Beau, "Anatomy of the Human Body," Paris, part iii., 1850, Plate 72.

[2] Hart, "Atlas of Female Pelvic Anatomy," 1884, Plate vi., fig. 4, p. 10.

ovary is much increased by enlarging the size of that right ovary, over the ovary of the opposite or left side.

Thus *Veit*,[1] out of 150,000 cases of twins, found that 50,000 cases were both boys, and 46,000 cases were both girls.

Galabin,[2] besides quoting Veit's figures, also gives, from the Guy's Hospital Maternity Charity, the percentages as 38 per cent. both boys, 28 per cent. both girls.

Porter Mathew[3] gives the percentages as 58 per cent. both boys, 16 per cent. both girls.

Rumpe, quoted by Jewett, gives "31 cases both boys, 16 both girls."

Spiegelberg,[4] too, states that twin boys occur more often, for "two females are rarest."

Parvin[5] also says that "twin males predominate over females."

Garrigues[6] says: "The rarest combination is that of two females."

Jewett[7] says: "The proportion of twin males is largely in excess."

Not only does Nature thus relatively increase the number of male or right-sided ova she produces, but she renders their fertilisation more probable, by so placing the right cornu of the uterus, the right Fallopian tube, and the right ovary, that access to them by the spermatozoa is actually easier than to the opposite or left side. Further, the right tube is larger than the left, so that the passage of the spermatozoa is facilitated (see Figs. 3 and 18).

Thus *Spiegelberg*,[8] *Playfair*,[9] and *Parvin*[10] agree that "a slight rotation occurs by which the left side (of the uterus) is thrown towards the front, and the right (side) backwards."[11] Consequently the right cornu uteri, tube, and ovary lie on a

1 Veit, quoted in Lusk's "Midwifery," 1889, p. 230.
2 Galabin's "Midwifery," 1900.
3 Porter Mathew, "Clinical Observations on Two Thousand Obstetric Cases," 1898, p. 55.
4 Spiegelberg, *op. cit.*, p. 271.
5 Parvin, *op. cit.*, p. 165.
6 Garrigues, "Science and Art of Obstetrics," 1902, p. 259.
7 Jewett, "Practice of Obstetrics," 1907, p. 316.
8 Spiegelberg, *op. cit.*, p. 32.
9 Playfair, *op. cit.*, p. 33.
10 Parvin, *op. cit.*, p. 71.
11 See also Gerrish in the chapter on "Anatomy," and Tweedy and Wrench, "Practical Midwifery," 1908, p. 248.

lower level in the pelvis than do those of the left side when the woman is lying on her back, and thus access of semen to the right tube is favoured. This is still further facilitated by the fact that more women invariably sleep on the right side than on the left—so much so, that *Spiegelberg* even considered the more usual right lateral posture for sleep as responsible for the inclination of the uterus to the right side of the body.

From inquiries I have made of many scores, of married women especially, I found the majority *do* sleep on their right side. Further, I find this habit is due to the anatomical fact of the presence of the heart on the left side; for in lying on the left side a woman's left breast is pressed upon the region of her heart, and its action is not only accelerated, but it becomes very distinctly audible to her—in fact, palpitation disturbs her rest, and this she avoids instinctively by turning on to her other side. Here the pressure of the right breast on the chest wall has necessarily no disturbing effect. I have further proved this by noting that women with ill-developed breasts sleep on either side at will; a woman with well-developed breasts sleeps nearly always on her right side. Some of the semen usually enters the womb directly *during* coition, it being drawn in by a suction-like action on the part of the uterus. Were it not so, a mercurial vaginal injection just after coitus should invariably prevent pregnancy, which it does not. Owing, however, to the motility of the spermatozoa, this action of the uterus is not absolutely essential to successful fertilisation.

If the Fallopian tubes are to be looked upon as receptacles for the semen (see the chapter on "Fertilisation"), it is evident that the tube which usually lies on a lower level is the one into which gravity, acting soon after coitus, will help to carry most of the semen; and the larger right will contain more.

Although the spermatozoa are known to *travel* greatly through *their own motility*, yet this more dependent position of the uterine opening of the right Fallopian tube must to some extent help to secure the entrance into the right tube of a greater amount of semen, and thus the fertilisation

of the right-sided ova is rendered more probable. On the other hand, women who sleep chiefly on the left side must render the access of semen to the right Fallopian tube more difficult, though of course, owing to the motility of the spermatozoa, far from impossible.

This greater accessibility of the right Fallopian tube to the semen must, of course, only rank as a *contributory* reason for more boys being born than girls; the chief reason being, as we have seen, that more male than female ova are produced.

The fact that the male birth-rate among Jews of all nations is higher than the male birth-rate among Christians —*Rauber* gives the figures as 107·6 male Jews to 106·4 male Christians—is due entirely to religious and social reasons, and has nothing to do with the prohibition of sexual congress till a week has elapsed after the cessation of a menstrual period.

The Jewish religion very strongly condemns—

(*a*) The artificial prevention of pregnancy.
(*b*) The procuring of abortion.
(*c*) The taking of drugs with the intention of inducing miscarriage.

We know that women more readily abort and miscarry with male children; hence whatever prevents abortion or miscarriage leads to an increased number of boys being born.

The Jewish women, too, are more zealously taught the rearing of children after their birth, so that with greater care more male infants are reared than is the case among Christian women.

And, again, infanticide amongst the Jews is almost unknown.

The only exception to the usual greater birth-rate of males to females of 106 to 100 is found in illegitimate children.

We find that the percentage of illegitimate boys born to illegitimate girls is reduced to 103 to 100—a difference of 3 per cent. More girls are thus born relatively, not absolutely.

This birth of a greater number of illegitimate female children applies chiefly to young women and their first

child—the result of indiscriminate insemination. It is not seen in those young women who have more than one illegitimate child, neither is it found among the children born of people "living together," but not actually legally or clerically married.

Illegitimacy is undoubtedly the chief cause of criminal still-birth, and most authorities put the chances of an illegitimate child being "still-born," when compared with the legitimate, as about 2 to 1. *Bertillon* puts it as 193 to 100.

As a rule in *first* labours, 1 child in 11 is still-born, whereas in other labours only 1 in 32 is born dead.

In this connection it is curious to note that, while *Bertillon* affirms that first children are more likely to be males, *Schenk* states just the opposite—that among the first-born there are a greater number of females.

Two important points must be borne in mind when we consider this greater relative birth-rate of illegitimate girls.

FIRST. We must not forget that in unmarried women very numerous attempts to procure abortion are made, and that women abort and miscarry with a male child more often and more readily than with a female.

Hence, abortion being more readily induced if the embryo be a male, it follows that if pregnancy is not thus interrupted a female is more likely to be born.

SECONDLY. If pregnancy proceed naturally, the careless attention at the hands of old untrained women which the majority of these single women receive during the actual confinement, amounting almost to criminal neglect in the delivery of their infants, leads to the larger-headed male child not being helped into the world as he probably would be were his mother married. Therefore he is more likely to be born dead, and so is not registered.

It is possible to delay the birth, or to omit to deliver or to tie the cord quickly enough for the child to be alive—sins of omission. There are also sins of commission I need not allude to.

On the other hand, the smaller female infant slips more readily into the world, and hence we get a relatively larger number of girls born illegitimately.

As the law neither required the registration of the birth of children born dead, nor a medical certificate of the cause of the still-birth, many so-called still-born children were not really so, but came alive into the world, and died of neglect, exposure, suffocation, or other illegal means.

The Registrar-General's report for 1907 shows[1] that—

"In thirty years the birth-rate of illegitimates has declined from 14·4 per 1,000 unmarried or widowed females of procreative age in 1878, to 7·8 per 1,000 in 1907."

If full details and statistics of the sex of illegitimate conceptions, not live births only, could be procured, it is very doubtful if they would show this greater proportion of females.

[1] *Cf.* "The Hospital," April 24, 1909, p. 92.

CHAPTER XVI

THE INFLUENCE OF LATERAL DECUBITUS ON SEX DETERMINATION

It is difficult to trace back to its origin the belief in the influence of lateral decumbency on sex determination.

The theories which have been advanced as to the influence of a lateral posture on the causation of sex take three more or less distinct forms.

The *first*—I mention only to discredit it—is that sex is dependent on the woman lying on one side " at the time of coition."

This contention is manifestly absurd, as a lateral position is neither normal nor even common.

A *second* theory, first broached in the " Lancet,"[1] was that sex depended on which side you habitually slept of your wife: if on the left side, you beget girls; if on the right side, boys are born.

In answer to this the editor of the " Lancet " asked, How is the variation of sex in the same family to be accounted for? while I ask, Whence come boy and girl twins? and What settles the sex of the children whose fathers and mothers did not sleep together at all?

The *third* idea is of great antiquity, and has obtained wide notoriety and belief.

It is that a woman must turn on to her right side *directly after coition* for a male pregnancy to result, or on to her left side directly after, to insure giving birth to a girl.

This theory was certainly known to Avicenna, a physician living in Ispahan in the tenth century; and Albertus Magnus, in 1582, knew of it and quoted it.

Millot, a French doctor, writing in 1816, also supported the idea, and further ascribed boys to fertilisation of the

[1] " Lancet," 1870, vol. i., p. 608.

ova from the right ovary, and girls to fertilised left ova; but, unlike my theory, he ascribed to the father his share in sex causation.

This theory of turning on to one or other side *after* coition, to produce the sexed child desired, is credited in many parts

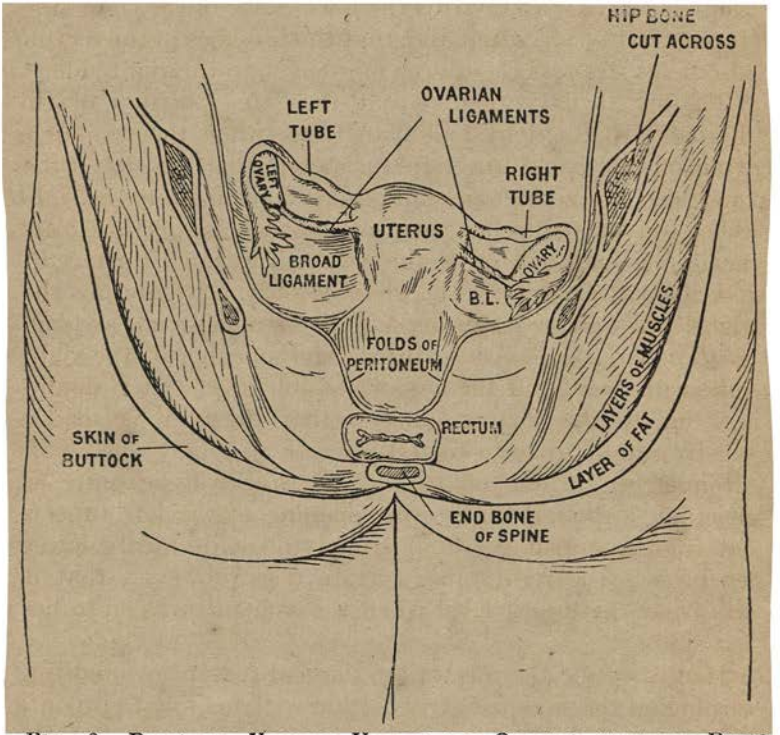


FIG. 18.—POSTERIOR VIEW OF UTERUS AND OVARIES, WITH THE FOLDS OF PERITONEUM FORMING THE BROAD LIGAMENTS, ETC. (Modified from Dickinson and Hodge.)

The figure shows the uterus lying more in the right half of the pelvis, its anterior surface facing more to the right, and the right tube and ovary carried backwards. The back of the pelvis, etc., has been removed.

of the country to this day, so that it may be called the popular view. It has been advocated without in any way being aware of or appreciating the anatomical conditions which secure for it at least some element of truth, as well as prospect of success; for it is only recently that the Fallopian tube has been acknowledged to be the most usual site of fertilisation.

I have already alluded in Chapter XV. to the fact that the majority of women sleep on their right side, and that to this fact of lying chiefly on the right side *Spiegelberg* (cf. p. 7) credited the usual position of the uterus in the pelvis; for, owing to gravity, the weight of the uterus would cause it to fall over towards the lower level of the right side. It must not be forgotten, too, that the presence of the rectum also helps to press the uterus more over to the right side.

Further, I have pointed out that this position of the uterus, with its right Fallopian tube (when the woman is lying on her back) lower in the pelvis than the left tube, must lead to a greater amount of semen getting into the right tube, and thus the chances of male ova being fertilised are much increased. Now, if the woman turn on to her right side just after coition, the chances of semen entering the right tube and so fertilising a right or male ovum are still *further* increased, because the uterine opening of the right tube will then be at the lowest possible level. It is doubtless due to this anatomical fact that the idea has had a substratum of truth to keep it alive.

Similarly, turning on to the left side will be quite as effectual, although the uterine opening of the left tube is not (in the dorsal position) already on a decidedly lower level, as is the right tube; certain it is, however, that it will be at the lowest level when the woman turns on to her left side.

Hence we see there is an anatomical reason for crediting turning on the side just after coition with helping to procure the sex required; we must not forget, however, that the *primary essential to successful fertilisation, following turning on one or other side, is the presence in the tube of that side of a fertilisable ovum from the corresponding ovary.*

We must not overlook that, although position may lead to one or other tube receiving most semen, yet the spermatozoa are able to, and do, travel very greatly in virtue of their own motility, as is proved in cases of pregnancy without actual penetration or vaginal insemination.

This fact of lateral inclination leading the semen to the tube whose uterine opening is thus on the lower level is made use of by stock-breeders, who, by placing a cow or

mare looking down, and standing with one side down a slope, endeavour thus to direct the spermatozoa into the "side" of the uterus which is down-hill, and so give them the sexed fœtus they require.

I have seen this followed by the desired result, though it is of course evident that it may fail *because the ovary of the side which gives the sex desired has not ovulated;* for everything points to the fact that in the monotocous animal ovulation takes place unilaterally, and from each ovary alternately.

A Scotch stock-breeder puts the whole matter to me thus:

"It is a well-known fact that the mother carries a colt foal or a bull calf on the right side, and a filly or heifer on the left; so that if a mare is covered and left standing with her right side down hill, she will have a colt (or male) foal."

He has been successful in this way, and tells me a veterinary surgeon at the West of Scotland Agricultural College has claimed successful production of the desired sex in one hundred consecutive cases.

This, therefore, is a practical demonstration that the right ova are male, and by directing the spermatozoa to the right Fallopian tube the production of a male is rendered more probable.

Having thus seen the effects of lateral decubitus on the determination of sex, I shall now consider the effects of sex on lateral decubitus in the pregnant woman.

I have already shown that occasionally the placenta is fixed quite to one or other lateral wall of the uterus, but more usually it is situated on the anterior or posterior wall, slightly more to that side of the mid-line which corresponds to the ovary which produced the ovum. *Dorland*[1] says:

"The point of attachment of the fecundated ovum is generally high up on the posterior uterine wall, *near the orifice of one of the Fallopian tubes.*"

From manual examination of the interior of the uterus just after the birth of the child, *Dr. Tuckey*[2] was able

[1] Dorland, "Modern Obstetrics," 2nd ed. 1901, p. 46.
[2] "Medical Press and Circular."

on several occasions to find the placenta attached chiefly to the left side of the uterine mid-line when the child was a female, and to the right side of the mid-line of the cavity when the child was a boy; from this he too came to the conclusion that boys were derived from the right ovary and girls from the left, but he did not dissociate the father from any share in sex causation.

It is evident, from this lateral position of the placental site, that the child usually develops more to one side of the uterus than the other; and from this *R. von Braun*[1] has derived the earliest evidence of pregnancy—a furrow forming and dividing the uterus into two different-shaped lateral halves, the pregnant and the non-pregnant.

> "Its presence he attributes to changes in consistence and the alteration between contraction and relaxation of the portion of the organ in which the ovum is situated."

The pregnant side of the uterus being thicker in an antero-posterior direction.

It is thus somewhat akin to the pregnant and non-pregnant cornu of a bifid uterus.

The male ovum having entered the right lateral half of the uterus chiefly develops on that side, while the female similarly develops more on the left of the uterus; hence it comes to pass that the sex of the child a woman is carrying, in some cases influences the posture in which she sleeps, for if a woman being pregnant with a girl lies on her left side she has no pain because the relations of the fœtus and the placenta are not disturbed; if she turn over on the other side, however, the child falls downwards to the lower level of the right side and thus leads to dragging on the placenta situated to the left side, and the pain soon makes her turn again to the painless side. It is to be remembered that by the time the placenta is formed, the child floats in the liquor Amnii and is capable of considerable movement in utero.

Similarly, if pregnant with a boy, turning on her left side gives pain because the child, falling downwards towards the lower left side, drags by its umbilical cord upon its placental

[1] Quoted by W. Williams, *op. cit.*, p. 162.

site on the right side of the uterus; if however she lie on her right side, the side corresponding to the sex of the child, no pain is complained of, for the child and the placenta are approximated.

The following cases will support this:—

Mrs. H. R. B., when pregnant with her girl, noticed she could only sleep on her left side—*i.e.* she could lie on her right side for a short time, but could not get off to sleep if lying on the right side.

Now (April 1902) she is again pregnant, *she can only sleep on her right side*, and she finds her position for comfortably sleeping is exactly opposite to what it was during her last pregnancy.

From this one fact alone I foretold she would have a boy. A boy was safely born in June 1902.

Mrs. O. S. had 7 boys and 1 girl. She noticed that movement in bed gave her far more pain on the left side, when carrying the girl, than on her right side. She could not lie on the right side when pregnant with the girl—in fact, she said "She could not sleep at all on the right side when carrying the girl." She found lying on the left side eased the left-sided pain. She *always* slept and lay on her right side when pregnant with the males, and noticing the difference in the decubitus made her think she was not going to have a boy, when, unknown to her, she was pregnant with a girl.

Mrs. D. B. had 5 girls followed by 3 boys. She could only lie on her left side (for any length of time) when she was pregnant with a girl. During her last three pregnancies she found it was uncomfortable to lie on her left side—in fact she could not do so for long.

After the first boy was born, when she was again pregnant, she felt sure, and correctly foretold on two occasions, that she was again to have a boy, owing to her inability to lie on her left side in those last two pregnancies.

She could only lie on her right side for long when she "carried" the boys.

The next case is not quite so conclusive.

Mrs. C. S. had 4 girls followed by 2 boys. When pregnant with the two boys she could *only* sleep on her right side.

When pregnant with the girls she could sleep in any position.

We thus see that the sex of the child has, in *some few cases* at least, a determining influence on the position in which the pregnant woman can most comfortably lie.

Of course if the placenta be attached to the mid-line of either the anterior or posterior wall of the uterus the patient does not experience these definite unilateral pains when lying down.

CHAPTER XVII

THE PROPORTION OF THE SEXES IN INDIVIDUAL HUMAN FAMILIES

THERE is no fixed or stereotyped composition in the human family, and the proportion of the sexes to be born to any one couple is an uncertainty, while the different families which different parents have, or rather used to have, present an infinite variety.

This uncertainty has given rise to endless heartburnings and suspense.

The statistics of present-day families, however, are quite useless for the study of the proportion of different-sexed children born to each married couple; hence we have to look backwards to the days of our grandparents, to the olden days of earlier marriages, and prior to what may be called " the artificial prevention of pregnancy era." Then the marriage of two healthy individuals naturally led to large families, with the children of different sexes; and many and diverse were the designs in pins, etc., expressive of welcome to the " little stranger." These are now rarely seen, though suspense as to the sex of the coming infant still precedes its birth.

The following may be looked upon as cases of natural families; they are examples of well-assorted ovarian activity.

Mrs. R. had her children thus: 1, B[1]; 2, 3, 4, 5, G[1]; 6, B; 7, 8, twin G; 9, 10, 11, 12, 13, 14, 15, B; 16, 17, B and G twins.

Mrs. K. had 1, 2, 3, 4, 5, B; 6, 7, G; 8, B; 9, G; 10, B; 11, 12, twin B; 13, 14, B.

[1] B=boy, G=girl. The figures denote the order of birth, and show the number in the family.

Mrs. W.: 1, B; 2, G; 3, B; 4, 5, G; 6, 7, 8, B; 9, 10, G; 11, B; 12, 13, G.

Mrs. P. B.: 1, G; 2, B; 3, G; 4, B; 5, G; 6, 7, 8, 9, 10, 11, B; 12, G; 13, 14, B; 15, G.

Mrs. B. R.: 1, G; 2, B; 3, 4, G; 5, 6, B; 7, 8, G; 9, B; 10, 11, 12, G; 13, B.

Mrs. L. V.: 1, 2, twin B; 3, B; 4, G; 5, B; 6, 7, 8, G; 9, 10, 11, B; 12, 13, G; 14, B.

Mrs. G.: 1, 2, 3, B; 4, G; 5, 6, B; 7, 8, 9, 10, 11, G; 12, 13, 14, B.

Mrs. G. L. P.: 1, 2, 3, 4, G; 5, 6, B; 7, 8, G; 9, B; 10, G; 11, B; 12, G.

Mrs. O.: 1, G; 2, 3, B; 4, G; 5, 6, 7, B; 8, 9, G; 10, B.

In the following cases of families with numerous children, the different sexes came quite alternately:

Mrs. S. B. T.: 1, 3, 5, 7, 9, 11, 13, 15, girls;
2, 4, 6, 8, 10, 12, 14, 16, boys.

Mrs. W.: 1, 3, 5, 7, girls; 2, 4, 6, 8, boys.

Mrs. R.: 1, 3, 5, 7, 9, boys; 2, 4, 6, 8, 10, girls.

Mrs. A. P. S.: 1, 3, 5, 7, 9, girls; 2, 4, 6, 8, boys.

Mrs. T. S.: 1, 3, 5, 7, 9, boys; 2, 4, 6, 8, girls.

Mrs. N.: 1, 3, 5, 7, 9, 11 and 12, boys; 2, 4, 6, 8, 10, girls.

Mrs. L.: 1, 3, 6, 7, 9 and 10, boys; 2, 4, 5, 8, 11, girls.

Mrs. H. C.: 1, 3, 5, 7, boys; 2, 4, 6, girls.

Mrs. C. B.: 1, 3, 5, 7, 8 and 9 (twin), girls; 2, 4, 6, boys.

Mrs. D.: 1, 4, 6, 8, 10, boys; 2, 3, 5, 7, 9, 11, girls.

These cases of women giving birth to children of different sex alternately give some support to the contention of the alternate action of the ovaries; certainly they are proof of the activity of both ovaries. They manifestly quite disprove such theories of sex as the relative age of parents, or relative vigour of the parents. For we can hardly expect relative vigour to alternate, say, every second year; while for the relative age to alternately vary is of course impossible.

That in the healthy state both ovaries are active, and that both normally ovulate regularly, is borne out by the

occurrence in families of an equal number of children of each sex, irrespective of the order of their birth. Thus, from many of my patients and friends the following cases will support this statement:

Mrs. K. H. B. had 8 boys and 8 girls.
Mrs. B. G. ,, 8 ,, ,, 8 ,,
Mrs. P. ,, 7 ,, ,, 7 ,,
Mrs. L. K. ,, 7 ,, ,, 7 ,,
Mrs. B. D. R. ,, 6 ,, ,, 6 ,,

Mrs. F. K., Mrs. G. S., Mrs. C., Mrs. P. G. G., Mrs. C. G., Mrs. A., Mrs. R., Mrs. K. V., and Mrs. M. all had ten children, five of each sex.

These cases go to prove that the two ovaries settle the sex, and that each sex is equally likely to occur with the slight preponderance of males (106 to 100) due to the slightly larger right ovary.

These cases *also* should disprove such theories of sex causation as relative age and vigour of parents, as neither age nor vigour can be supposed to change about so as to allow an *equal* number of children of both sexes to be born.

I have the names and particulars of many other families of eight children, four of each sex, and of six and four showing sexes equally divided; but I have only included the more numerous families, to show it was no coincidence.

If, instead of both ovaries being active, only one ovary is active, the other being functionless or absent—that is, Unilateral Sterility—we get all the children borne by that woman of the same sex, because ova of only one side, and therefore one sex, are provided.

UNILATERAL STERILITY.—There are several reasons to account for the inactivity of one ovary, or Unilateral Sterility, as I have elsewhere called it.

The CHIEF CAUSE of this sterility of an ovary is an inflammatory one. Very frequently after a confinement some inflammatory mischief sets in round about the uterus, or round one or other Fallopian tube or ovary, and leads either to the tube being obliterated or bound down, or the

ovary being thus affected. This may occur after the first or any subsequent confinement.

Indeed, *Drs. Hart and Barbour*[1] say:

"It is the rare exception to examine a parous female pelvis without finding some traces of a previous cellulitis or peritonitis";

and on p. 155 (prognosis as to sterility after pelvic peritonitis):

"The mechanical closure by pressure of the Fallopian tube, and ovaritis, rendering ovulation impossible, are conditions often produced."

ANOTHER CAUSE would be cases of severe appendicitis

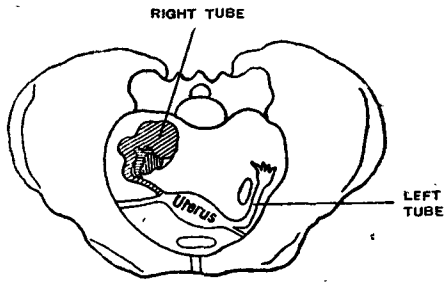


FIG. 19.—DIAGRAM OF RIGHT SALPINGITIS. (Modified from Martin.)

The right tube is both thickened and closed from inflammation and adherent to the right ovary, leading to right-sided sterility, so that future children would be females.

leading to inflammatory binding down of the right tube and ovary (cf. Dr. T. G.'s case, p. 175).

ANOTHER CAUSE of Unilateral Sterility is a rudimentary or undeveloped condition of one ovary, as in the following case:

A. W., aged 32, died in Westminster Hospital of cancer of the breast. P.M. "The uterus was large and subinvoluted, the right ovary was rudimentary." It was a case of undeveloped ovary.

Such cases lead to all children being of the same sex.

OTHER CAUSES of unilateral inactivity of an ovary are shrivelling, atrophy, or cirrhosis of the ovary, the proper ovulating tissue of the ovary being destroyed.

[1] Hart and Barbour, *op. cit.*, p. 159.

H. Reeves,[1] F.R.C.S. Ed., described a case of cirrhotic right ovary in a woman the subject of left ovarian pregnancy. The fœtus developed *in and from* the left ovary, and was a girl.

ANOTHER CAUSE of Unilateral Sterility is advanced disease in one ovary sufficient to prevent ovulation.

Dr. Spencer[2] described a case of large dermoid tumour of the right ovary: the woman became pregnant and gave birth to a girl, because, owing to the diseased condition of the right ovary, the left ovary must have provided the ovum.

Dr. Galabin[3] showed tumours of both ovaries removed at the fourth month of pregnancy:

"The right tumour was a dermoid cyst containing gruel-like fluid, which solidified on cooling. It contained also hair, loose teeth, and bone."

"The left tumour was an ordinary cystic adenoma, except that three small cysts in it were evidently dermoid. In the left tumour was seen a *large corpus luteum of pregnancy, and near it a small fragment of unaltered ovary*"—definite proof that this left ovary supplied the oösperm.

Unfortunately the sex of the child when ultimately born was not given; but I feel confident it was a girl.

Milander described a case where the left ovary was calcified and detached, and was lying free in the pelvis. It is evident that *that* ovary could not ovulate.

CONGENITAL ABSENCE of one ovary must, of course, result in Unilateral Sterility, or the production of one sexed children only. Such cases are rare, but of course give absolute proof that one ovary produces only one sex.

A very remarkable case is described by *Sir J. Bland-Sutton*.[4] A woman, aged 33, had given birth to a boy, when, because of a painful swelling behind the uterus, abdominal section was performed:

"The uterus was found to be of the unicorn variety, and to possess *one* Fallopian tube and a *well-developed ovary on the right side*. The

[1] H. Reeves, "Lancet," Oct. 1890, p. 872.
[2] H. R. Spencer, "Trans. Obstet. Soc.," 1898, pp. 16-18.
[3] Galabin, "Trans. Obstet. Soc.," 1896, p. 101.
[4] Bland-Sutton, "Surgery of Pregnancy and Labour complicated with Tumours." "Lancet" Reprint, vol. i. p. 50, 1901.

left side of the uterus was smooth and rounded, and *lacked a broad ligament, ovary, and Fallopian tube.*

"The right kidney occupied its proper position; the left one lay in the hollow of the sacrum, and proved to be the body behind the uterus. The patient made an uninterrupted recovery. About fourteen months afterwards the patient conceived, and had the satisfaction of being delivered of a fine child, a boy."

No case could be more conclusive.[1] The patient had given birth to a son before an operation disclosed the fact that her left kidney was congenitally misplaced—further, that not only was the uterus undeveloped and defective on the left side, but that her left Fallopian tube and left ovary *were entirely absent.* After the operation she became pregnant, and gave birth to *another* boy.

Thus there were *two* sons born to a woman who possessed only the right *ovary* in her body.

This unilateral sterility is of course also caused by unilateral ovariotomy, or the complete removal of an ovary and tube from one side by operation. The post-operative children in these cases (compare Chapter X.) are all of the same sex, because one ovary only breeds one sex.

CHILDREN ALL THE SAME SEX.

I have in Chapter VII. alluded to the fact that many females have *all the same sex offspring* even with different husbands, or in the case of animals with multiple male animals, showing that the question of sex rests only with the mother; but in the ordinary married state of one husband to one wife it is very remarkable, to say the least, how often that couple will only give birth to children of one sex. It points to the fact that only one ovary is active.

The following are cases in point, selected from families where the mother has finished childbearing. Only those having six or more children are given, less than that number hardly being conclusive:

[1] A reviewer objects to this case being called a conclusive proof in favour of my theory. Had he found a case, recorded by as reliable an authority as Sir J. Bland-Sutton, of absent left ovary, with the birth of two girls from ova from the right ovary, he would, no doubt, have written of it as a conclusive proof of the fallacy of my theory.

Mrs. G. M.	had	18	boys		Mrs. W.	had	20 girls
„ E. F. S.	„	15	„		„ H. B.	„	14 „
„ S. B.	„	11	„		„ R. H.	„	13 „
„ T. P.	„	9	„		„ M.	„	11 „
„ S. H.	„	9	„		„ T. L.	„	10 „
„ B.	„	8	„		„ D. M.	„	10 „
„ K. W.	„	8	„		„ B. L. G.	„	9 „
„ H. S.	„	7	„		„ M. R.	„	9 „
„ R. S. B.	„	8	„		„ C. B.	„	8 „
„ T. V. M.	„	8	„	No girls	„ G. D.	„	8 „ No boys
„ C. S.	„	7	„		„ S. H.	„	8 „
„ D. C.	„	7	„		„ L. C.	„	7 „
„ E. W.	„	7	„		„ A.	„	7 „
„ B. S.	„	7	„		„ H. U.	„	7 „
„ W. N. S.	„	7	„		„ F. W.	„	7 „
„ L. S. H.	„	7	„		„ W. H.	„	6 „
„ M.	„	6	„		„ L. F.	„	6 „
„ Z.	„	6	„		„ W. S.	„	6 „

I have details of many other families of smaller numbers not necessary to quote.

In cases of succession to title or fortune the extreme importance of having a son and heir is evident; some women, however, are quite unable to provide a male ovum for fertilisation, owing to Unilateral Sterility, however caused.

"A celebrated case,[1] which attracted great attention, occurred in the family of Sir Francis Willoughby, who died seised of a large inheritance. He left *five daughters* (one of whom was married to Percival Willoughby), *but not any son*. His widow at the time of his death stated that she was with child by him. This declaration was evidently one of great moment to the daughters, since, if a son should be born, all the five sisters would thereby lose the inheritance which descended to them. Percival Willoughby prayed for a writ *de ventre inspiciendo*, to have the widow examined, and the Sheriff of London was accordingly directed to have it done. He returned that she was twenty weeks gone with child, and that within twenty weeks *fuit paritura*. Whereupon another writ issued out of the Common Pleas, commanding the Sheriff safely to keep her in such an house, and that the door should be well guarded; and that every day he should cause her to be viewed by some of the women named in the writ (wherein ten were named), and when she should be delivered, that some of them should be with her to view her birth, whether it be male or female, to the intent there should not be any falsity. And upon this writ the Sheriff returned, that accordingly he had caused her to be so kept, and that on such a date she was delivered of a daughter."

So she had in all six girls and no boy.

[1] Montgomery, "Signs and Symptoms of Pregnancy," 1837, p. 35.

I conclude these cases with the following two extracts from newspapers, but cannot vouch for their accuracy, as I can of the above-mentioned cases:

"Daily Mail," April 22, 1901:

"The recent census in Italy has revealed some extraordinary cases. The wife of a Turin labourer, named Marie Danna, who married at 19, and is now 59, has had *thirty-four sons*. Thirty-one are now living, and are all at home with their parents."

"Daily Mail," March 5, 1897:

"An inhabitant of Arendskerke, in Holland, has notified to the municipal registrar the birth of his *twenty-first son*, all the others being alive and in the enjoyment of good health."

The above, then, are cases where the activity of one ovary is lost, the first fertilised-ovum-supplying ovary being the only one remaining active, and hence all the children are of the same sex.

Another class of family is where the sex of the first pregnancy differs from those that follow, thus:

Mrs. W. had first a boy, then 11 girls.
Mrs. B. B. had first a boy, then 5 girls.
Mrs. S. M. H. had first a boy, then 5 girls.
Mrs. H. M. had first a boy, then 6 girls.
Mrs. V. B. had first a boy, then 10 girls.
Mrs. N. had first a boy, then 8 girls.
Mrs. Y. had first a boy, then 7 girls.
Mrs. H. had first a boy, then 6 girls.
Mrs. M. B. had first a boy, then 6 girls.
Mrs. D. had first a boy, then 8 girls.

Mrs. W. J. had first a girl, then 12 boys.
Mrs. F. E. had first a girl, then 16 boys.
Mrs. McC. had first a girl, then 6 boys.
Mrs. B. P. had first a girl, then 9 boys.
Mrs. P. L. had first a girl, then 10 boys.
Mrs. L. S. had first a girl, then 7 boys.
Mrs. W. M. had first a girl, then 6 boys.
Mrs. C. H. B. had first a girl, then 11 boys.
Mrs. R. E. B. had first a girl, then 6 boys.

Here the ovary which supplied the ovum for the first pregnancy became after *that* pregnancy functionally useless, either from adhesions, or disease in it or its tube; so that in all the subsequent pregnancies the ova came from the other uninjured ovary, and the children were all of the same sex, and different from the first or primary pregnancy.

Here *unilateral* sterility *after the first* pregnancy is the cause.

A further class of family consists of cases, like that of the German Empress, where several boys are followed by a girl; and likewise a number of girls followed by a boy, such as—

Mrs. P. B. had 11 children, 10 boys followed by 1 girl.
Mrs. G. P. had 8 children, 7 boys followed by 1 girl.
Mrs. S. had 8 children, 7 boys followed by 1 girl.
Mrs. C. had 7 children, 6 boys followed by 1 girl.
Mrs. C. A. had 6 children, 5 boys followed by 1 girl.

Mrs. R. J. had 9 children, 8 girls followed by 1 boy.
Mrs. H. had 8 children, 7 girls followed by 1 boy.
Mrs. R. had 12 children, 11 girls followed by 1 boy.
Mrs. B. G. had 9 children, 8 girls followed by 1 boy.
Mrs. B. W. had 7 children, 6 girls followed by 1 boy.
Mrs. L. N. had 8 children, 7 girls followed by 1 boy.

Or again these—

Mrs. H. G. P. and also Mrs. J. both had 5 children, and both had 2 boys, then twin boys, and lastly a girl.

Mrs. H. had 8 children, 5 boys, then twin boys, and lastly a girl.

Mrs. G. had 12 children, 9 girls, then twin girls, and lastly a boy.

Mrs. B. C. S. had 22 children, 18 girls, then twin girls, followed by a boy, and lastly another girl.

In these cases the binding down of the ovary and tube which *did not act* must have been undone either by the number of pregnancies, or by the lastone, so that the ovary and tube were set free, as it were, once more, and at last were

able to act, with a change of sex as a result. That this liberation from adhesions is possible is stated by *Hart* and *Barbour*[1]:

"The adhesions (of Fallopian tubes) may ultimately yield to the stretching brought to bear on them by the developing uterus."

That this does definitely occur is absolutely proved by cases reported by *Dr. Herman*,[2] where he says:

"The ovary and tube, which were in 1886 so embedded in adhesions that the operator could not identify them, were in 1901 almost free, and were easily pulled up."

And by the writer,[3] in the same journal, "the right appendages were so matted and bound down," they could not be inspected in July 1901; while less than two years afterwards, no adhesions were met with, they had been absorbed, and thus liberated the ovary and tube.

This undoing or absorption of adhesions is now copied by surgeons who artificially release bound-down tubes, so that "many pregnancies have occurred after simple freeing of tubes from adhesion." (*Mrs. S. Boyd.*)

Frequent repetition of pregnancy—that is, a woman having several children rapidly; as well as cases of hydramnios (dropsy of the womb); and also cases of twins, which lead to excessive distension of the uterus during pregnancy; would all, owing to the stretching caused by them, be most likely to lead to absorption of adhesions round an ovary or tube.

Note, therefore, the above cases of twins being followed by a change in the sex of the succeeding child.

In some cases the presence of children all of the same sex is doubtless due to mere chance, fertilisation happening always to occur to the ova from one and the same ovary; *i.e.* fortuitous fertilisation. Conception occurs to an ovum from the same ovary that supplied the ovum for the last child born, hence the same sex child is again born; whereas, had conception occurred a month earlier or later, a different sex child would have appeared.

[1] Hart and Barbour, *op. cit.*, p. 155.

[2] Herman, "Journal of Obstetrics and Gynæcology of the British Empire," vol. ii. 1902, pp. 226-228.

[3] E. Rumley Dawson, "Journal of Obstetrics and Gynæcology," vol. iv., Sept. 1903, pp. 301-3.

CHAPTER XVIII

MULTIPLE CONCEPTIONS OR MULTIPLE PREGNANCY

HAVING explained the production of single births by means of my theory, it remains to see whether the theory will equally well explain the production of plural conceptions, twins and triplets, etc.

In looking for an explanation of the occasional birth of more than one child, we must not forget that, to quote *Playfair*,[1] "Plural births must not be classified as natural forms of pregnancy," or, as *Garrigues*[2] says, "Multiple fœtation must be looked upon as an abnormal event."

TWINS.

As regards the origin of twins, there are four ways in which they arise.

Variety A. 2 G. Fs.,[3] 2 ovaries, 2 ova, 2 sexes.

In these cases each ovary matures a G. F. at or about the same time, so that we get *one G. F.* with an ovum each from *each* ovary, therefore the fœtuses are of opposite sexes, one male, one female.

Playfair says:

"In the largest number of cases of twins the children are of opposite sexes."

Spiegelberg, *Pinard*, *Simpson*, and *Berry Hart*, all confirm this.

Veit,[4] quoted by *Lusk*, found in 150,000 cases of twins,

[1] Playfair, *op. cit.*, vol. i., 1898.
[2] Garrigues, "Text-book of Obstetrics," 1902, p. 258.
[3] G. F. = Graafian follicle.
[4] Lusk's "Text-book of Midwifery," 1889, p. 230.

in 54,000 the children were boy and girl, in 50,000 they were both boys, and in 46,000 they were both girls.

Churchill,[1] out of 1,321 cases of twins, found there were 495 cases of boy and girl, 416 cases of two boys, while 409 were cases of two girls.

Rumpe, quoted by *Jewett*, "Practice of Obstetrics," 1899, p. 296, found in 101 cases of two-egg or binovular twins, 54 were boy and girl—more than half, 31 both boys, and 16 both girls.

This marked preponderance of cases of boy and girl twins over twin boys, or twin girls, must have its definite cause, and they are necessarily of opposite sexes because the two ova come from opposite ovaries. And these cases of different sexed twins are necessarily most numerous, because the TWO OVARIES TOGETHER ARE MANIFESTLY LARGER THAN EITHER OVARY ALONE, SO THAT THE TENDENCY FOR THE TWO OVARIES TO PRODUCE TWO OVA—*i.e.* ONE EACH—AT, OR ABOUT, THE SAME TIME, MUST BE FAR GREATER THAN FOR EITHER OVARY BY ITSELF TO PRODUCE TWO OVA AT ONCE.

Hence we find that *an ovum* from *each* ovary is fertilised at, or about, the same time, more often than are *two* ova from the *same* ovary; but opposite sexed twins are the commonest, therefore we are justified in saying that opposite sexed twins are due to the opposite ovaries ovulating almost simultaneously.

There would be a corpus luteum in each ovary. It is in this variety of twins that we most often find two separate and distinct placentæ; they may, however, be fused together.

This is the only mode of origin of different sexed twins.

Variety B. 2 G. Fs. from 1 ovary, 2 ova, 1 sex.

Here the children are of similar sex, either two boys or two girls.

They are derived from two G. Fs. from one or other ovary; each G. F. contains a single ovum. In these cases, which are not so common, we find (instead of *each* ovary supplying *an* ovum) *one* ovary *alone will supply two* Graafian follicles, so that two ova are derived from the same ovary,

[1] Churchill, "Midwifery," 1866, 5th ed. p. 482.

and therefore the twins are the same in sex, either two males or two females, according to which ovary the ova came from. *Playfair* (*op. cit.*, p. 184) says:

"The most common cause of multiple pregnancy is probably the nearly simultaneous maturation and rupture of two G. Fs., the ovules being impregnated at or about the same time."

This therefore applies to both the varieties A and B.

The birth of both a dark and a light child to a negress is possible only in one or other of the above two varieties.

Birnbaum described a case of twin pregnancy where post mortem the left ovary contained two corpora lutea, but no sex was given.

In the following conclusive case *two* corpora lutea were in the right ovary, the right Fallopian tube had burst and a fœtus had escaped; its sex is not given, but I have elsewhere shown that a fœtus in the right tube and corpus luteum in the right ovary means a male gestation. The uterus contained another fœtus, a male.

"New Sydenham Society Year Book," 1862, p. 339, quotes the following:

"*Tuffnell's case.*—Patient pregnant between three and four months. *Post-mortem.*—Three or four quarts of fluid and clotted blood were found in the abdomen with a small fœtus floating therein. There was a rent in right Fallopian tube, and a cyst from where the fœtus had escaped. Right Fallopian tube and ovary agglutinated. Fœtus one inch long. The uterus contained a healthy male fœtus proportionate to the date of conception. The cystic cavity in the right Fallopian tube contained a solid organised mass like a miniature placenta. There were *two distinct corpora lutea in the right ovary.*"

This case proves a *twin male pregnancy*, with *both* ova coming from different Graafian follicles, but from the *same ovary, the right.* Hence the *same sex*, and that male. One fœtus had developed in the right tube, the other in the uterus. It was a combined Extra- and Intra-uterine male pregnancy.

In this variety of twins the placentæ may, or may not, be fused or grown together, and though there are often two quite distinct placentæ, I have found a single fused placenta (showing evidence of the amalgamation of the two original placental areas) in a small majority of my cases.

Variety C. 1 G. F., 1 ovary, 2 ova, 1 sex.

In this variety the children are of the same sex. One or other ovary supplies the single G. F. which happens to contain two ova (cf. K, Fig. 8, p. 17); the sex will be identical, but will depend on which ovary supplied the G. F. *Playfair*[1] says:

"It may happen that a single follicle contains more than one ovule, as has actually been observed before its rupture."

This anatomical fact has the support of *Lusk*[2] and *Hirst*,[3] who reproduce a drawing of *Waldeyer's* showing the two distinct ova in a single G. F. Its occurrence is also admitted by *Piersol*,[4] *Berry Hart*,[5] and *Whitridge Williams*.

In these cases only one corpus luteum would be found in one or other ovary, although two children were born. This fact was distinctly pointed out by *Montgomery*,[6] who says.

"A vesicle may contain two ovules, in which case twins may be accompanied with only one corpus luteum."

The children in this variety will more closely resemble each other than in Variety B.

Variety D. 1 G. F., 1 ovary, 1 ovum with 2 nuclei, 1 sex.

The children are of the same sex; because they have arisen from a double nucleus or germ-bearing ovum derived from one or other ovary, they will be very much alike. This variety thus differs from the former, as the single G. F. contains but a *single* ovum, but that ovum contains a *double* germ or germinal vesicle (as is common in fowls' eggs) (cf. H, Fig. 8, p. 18); we thus get the so-called unioval, homologous, or identical twins, which are stated to be seven times more rare than other forms, and we find them not only *always* alike in sex (which fact *Schroeder* pointed out long ago), but sometimes joined together. *Playfair* (p. 186) says:

"Conjoined twins must of necessity arise from a single ovule with a double germ, and there is no instance on record in which they were of opposite sexes."

[1] Playfair, *op. cit.*, p. 185.
[2] Lusk, *op. cit.*, p. 37.
[3] Hirst, *op. cit.*, p. 54.
[4] Piersol, *op. cit.*, p. 143.
[5] Berry Hart, "Guide to Midwifery," p. 247.
Montgomery, "Signs and Symptoms of Pregnancy," 1st ed., 1837, p. 231.

This should, I think, help to prove my theory, by showing that *one ovary always "breeds true."* That is, ova from one ovary only produce one sex. The children's hair will *always* be the same colour when derived from a single ovum, whether the twins are conjoined or not. Undoubted examples of ova with double germs or two nuclei have been reported, and are now admitted to occur by most authorities. *Norris and Dickinson*[1] reproduce a drawing of *Von Herff's* showing two well-marked nuclei in one ovum, and *Whitridge Williams*[2] figures a good example, the two germinal vesicles or nuclei being distinctly separated in the ovum; while he states that "the existence of such ova (containing two distinct germinal vesicles) is indisputable."

Dr. T. Wilson[3] says:

"There is a much greater predisposition to the occurrence of hydramnion in cases of twins derived from a single ovum than in the commoner variety of twins developed from separate ova.

"The unioval variety of twins is of interest for many reasons. The fœtuses are always of the same sex, and are much more alike than are those developed from different ova. They have a single placenta, in which an anastomosis takes place between their vessels; acardiac monsters are generally admitted to arise only in this variety of pregnancy."

Some cases of twins from a single ovum—possibly all the acardiacs—are *believed* to arise, not from double nuclei in an ovum, but by splitting or division into two of a single nucleus, though no one has seen such an occurrence; but *single nuclei have* been seen to contain *two nucleoli* or germinal spots, as in a specimen figured by *Nagel* in *Playfair's* "Midwifery"; so it is possible that, division of the nucleus being purely supposititious, is not necessary, if it occur at all.

It must not be supposed, if two G. Fs. rupture, and two ova are discharged, that they are sure both to be fertilised; even if both be fertilised, one may easily die in the uterus. *Playfair*[4] says:

"This is proved by the occurrence of cases in which there are two corpora lutea with only one fœtus."

[1] Norris and Dickinson, "American Text-book of Obstetrics," 1897, p. 71.
[2] W. Williams, *op. cit.*, p. 327.
[3] "Trans. Obstet. Soc.," 1899, p. 237.
[4] Playfair, *op. cit.*, p. 184.

This is confirmed, as pointed out by *Montgomery*,[1] by many authors, and by its occurrence in domestic animals. In one case Montgomery examined there were "ten corpora lutea in the ovaries of a sow, but only nine fœtuses in the uterus." After a diligent search "the remains of another fœtus which had been blighted" was found. I have practically proved the truth of this with rabbits.

The explanation of the development of the second corpus luteum in the absence of the second fœtus is that the presence of one fœtus is quite sufficient to cause both corpora lutea to develop into true corpora lutea.

The Sex of Twins.

From the foregoing particulars we see that as regards their sex twins occur in the following order of frequency:

A. Boy and girl twins.
B. Boy and boy twins.
C. Girl and girl twins.

The first variety are known as pigeon-pair or different sex twins, and occur most often; B and C, consisting of children of different sex, are usually classed together as same sex twins, and if so added together these two varieties of same sex twins outnumber (as we should expect) the first variety, or twins of different sex.

Variety B are more numerous than C.

It is necessary to point out very clearly this misleading inclusion of children of different sexes under the heading of "same sex twins," as astonishing errors and discrepancies appear in some text-books as to the relative frequency of the sexes in twin births.

We see, therefore, that different sex twins are more often born than either 2 boys or 2 girls, but add together the twin boys and the twin girls and call them "same sex" twins, then this *combination of boys and girls* together outnumber the *cases of boy and girl twins*—that is, though different sex twins are most often born, yet same sex twins are most numerous!

[1] Montgomery, *op. cit.*, p. 230.

Here I may notice an objection raised by a reviewer, who imagined that *boy and girl twins* disproved my theory; for, said he, it showed that the ovaries did not *always* ovulate alternately, but that both ovaries must in these cases have acted at one and the same time. Quite so. I have certainly not said they *always* did act alternately, but they do *usually, normally;* and when they exceptionally ovulate simultaneously, we get the unusual or exceptional condition of different sex twins—provided both ova be fertilised, which, of course, does not always occur.

Boy and girl or different-sex twins, then, are evidence of simultaneous ovulation by both ovaries. See the cases of twins in detail described in Chapter XXIII., pp. 191-194, showing which ovary acted "out of its turn."

TRIPLETS.—It will be quite easy to understand how triplets occur from what has been said about twins, and how triplets follow the same rule as to their sex. Usually one ovary gives rise to twins, and the other to a single birth. In this case two of the children are alike in sex. If the children are all of the same sex, one or other ovary provided them all, one G. F. providing either two ova, or else one ovum with a double germ, and the other G. F. supplying a single ovum; though one ovum may rarely give rise to all three children—uniovular triplets.

W. Williams[1] says:

"Occasionally two, and sometimes three, distinct ova may be found in a single follicle, and it is from such structures that multiple pregnancies not infrequently develop";

so that one corpus luteum only may be found in a case of triplets of the same sex. The case described by *Saniter*[2] would have been such an example had it been possible to have examined the ovaries, for the triplets were *all* males, derived from a *single ovum,* and there was only *one placenta.*

I have not been able to find a report of a case of three corpora lutea of pregnancy discovered in one and the same ovary; but probably the cases described by *Dr. H. R. Spencer*[3] and by *Dr. G. Bate* in the "Lancet" would each

[1] Williams, *op. cit.*, p. 63.
[2] Saniter, "Brit. Med. Journ.," Epitome, March 30, 1901.
[3] Dr. H. R. Spencer, "Trans. Obstet. Soc.," vol. xxxv. 1893, pp. 107-110.

have shown three corpora lutea in the left ovary, for the triplets were "all girls, and there were three separate placentæ" in both cases.

G. W. Thompson[1] records a case of triplets—a double female monster and a single male child:

"The single male child was born first, was still-born, and had a *separate* placenta and membranes. The sex was female of the united fœtus, which had two heads, four arms, and four legs, and two bodies united by the thoraces."

It is practically certain that the female monster came from the ovary opposite to that from which the single male child did.

Dr. W. Krusen[2] of Philadelphia has described a case of triplets in the right Fallopian tube. They were of only two months' development, and no sex was given. Compare also *Dr. Russell Andrews'* case of male twins in the right Fallopian tube (p. 71).

Triplets follow the rule of twins—that owing to the rather larger right ovary there are more boys than girls produced, the commonest occurrence being 2 boys and 1 girl, this combination being twice as numerous as any other combination. *Freureisz*,[3] in over thirty years' experience, met with four cases of 2 boys and 1 girl, but only one case of 2 girls and 1 boy. It therefore corroborates and explains the statement of *Saniter* quoted by *Williams*,[4] that "in triplet pregnancy the children are usually derived from two ova—one from one, and two from the other"—because twin boys from one ovum are far commoner than twin girls from one ovum; and a case of triplets in a colleague's practice bore this out, the two boys being uniovular twins, and the girl was from a different and distinct ovum—from, I maintain, the opposite ovary.

Compare the case of triplets described in the note on p. 145.

Dr. Voron[5] describes a case of triplets with two girls and a boy, who was the last born. There were three distinct

[1] "Indiana Med. Journ.," April, 1899.
[2] "Brit. Med. Journ.," Jan. 1902, p. 43.
[3] Freureisz, Gynæcologia No. 4, 1902.
[4] Williams, *op. cit.*, p. 327.
[5] Dr. Voron in "Bull. de la Soc. d'Obstet. et Gynecol. de Paris," June, 1912.

cords inserted marginally into a single-looking placenta. "There was a bag of membranes for each fœtus." Injection of the umbilical arteries with three different colours showed "there was no vascular communication between the placentæ," "the coloured areas being distinct and sharply limited." This therefore showed that the pregnancy was due to the fertilisation of three distinct ova, "with subsequent fusion of the adjacent parts of the three placentæ." I should have expected two corpora lutea in the left ovary, and one in the right.

Almost identical with the above was the only case of triplets I have personally attended.

There were 2 girls and 1 boy, but with three separate and distinct, not fused, placentæ, each following its child's birth. Here, too, three distinct ova had certainly been fertilised—I say two from the left ovary and one from the right.

QUADRUPLETS.—If both ovaries give rise to twins, we get quadruplets; or if one ovary gives triplets and the other a single birth, as in a case by Simpson, 3 males and 1 female. Here the right ovary must have ruptured two G. Fs., one of which contained two ova, or else had a double germ in one; while the left ovary supplied a single ovum only.

If all four children are the *same* sex, it is possible only two G. Fs. are present, both G. Fs. containing two ova; or one G. F. with two ova, the other G. F. having one ovum but a double germ. If there were three G. Fs. the arrangement is quite simple.

It is possible for one G. F. to supply quadruplets; the children would be all the same sex. The G. F. would then contain two ova, and each ovum a double germ.

The following case is very suggestive, from the appearances of the placentæ, of the origin from the two ovaries of two ova *each* to form the quadruplet birth:

M. Etchecoin[1] reported a case of quadruplets:

"The mother had borne her first child nineteen months before she was delivered prematurely, at the fifth month, of 4 infants—2 males and 2 females. There were four placentæ adherent in pairs."

[1] "British Medical Journal," October 19, 1901, p. 1166.

The following case proves very decisively that the one ovary produced the male child, and the other ovary the three females:

Baudouin, in the "Paris Medical Gazette," describes a recent delivery of quadruplets, in which—

"one ovum contained *three* fœtuses, two of them forming a sterno-pagus (*i.e.*, were joined together at the chest), all of the female *sex*. After their delivery a second bag of waters ruptured, and a *still-born* male child followed."

There were thus two ova only.

Dr. Lloyd Roberts[1] reports a case of quadruplets—

"all females. Placenta was single. Four cords were distinct. A single chorion enclosed four amniotic sacs."

They were therefore derived from one ovum, and therefore from one ovary—I should maintain the left.

Dr. Clifford White[2] reports a case of 3 males, 1 female. Two males were uniovular twins and stillborn; the other boy and the girl were alive. The males were born by the vertex, the female by the breech. So the four children came from three ova.

Dr. Nijhoff,[3] of Groningen (Netherlands), reports a case of quintuplets—4 girls and 1 boy. Three of the girls were derived from one ovum, and represented uniovular triplets; while the other girl, and the boy, arose from two separate ova.

"The placenta consisted of one continuous cake. At the fœtal side five separate umbilical cords were inserted, each in a distinct sac formed by the fœtal amnion. Three of these sacs were enclosed by a common chorion. The two others had a separate chorion."

This is direct evidence of fertilisation of three ova, and I maintain the girls were derived from the left ovary and the boy from the opposite one.

Baudouin,[4] in discussing SEXTUPLETS, brings out the fact that, as in twin births, the number of boys far exceeds the girls. Thus in one case all the six children were boys; in

[1] "Journal of Obstetrics and Gynæcology," vol. iii. 1903, p. 91.
[2] "Proc. Roy. Soc. of Med.," January 1910, vol. iii., p. 79.
[3] *Ibid.*, July 1904, vol. vi. p. 32.
[4] *Ibid.*, vol. vi. p. 52.

another case 4 boys and 2 girls; while another was 5 boys and 1 girl. Thus three cases give 15 boys to 3 girls!

It will thus be seen that plural pregnancies entirely support my theory; and *no theory*, such as either nutrition theories; infrequency or frequency of intercourse theories; or strong versus weak spermatozoon theories; or the relative *vigour* theory, or even the relative *age* theory of the parents, can *possibly* explain the occurrence of boy and girl or "pigeon-pair" twins, to say nothing of triplets and quadruplets. This fact also disproved Schenk's hypothesis; for if an ovum in a woman, whose urine through dieting habitually contained sugar, invariably developed when fertilised into a girl, and the presence of that sugar rendered the birth of a boy impossible, how *could* any woman be pregnant with both a boy and a girl at the same time, or with two of each? In fact, a preliminary careful study of plural pregnancy would have prevented many theories of the causation of sex ever being broached.

The varying arrangement of the fœtal membranes, and the fact that conjoined twins are always of the same sex, are both only satisfactorily explicable by the present theory.

Close study of plural pregnancy demonstrates clearly that such an occurrence must be ascribed to the mother and not to the father.

We know that many million more spermatozoa are provided every time (*Lode* estimated them as over 200,000,000 in a single ejaculation) than are necessary to simply fertilise the normal single monthly provided ovum.

If, however, for some reason, probably anatomical, more ova are regularly provided, we must expect plural pregnancies. *Puech* definitely alleges "superior development of the ovaries" as the cause of the simultaneous development of multiple ova, and here we may recall that a quite healthy ovary has been found which measured $3\frac{3}{4}$ in. in its long diameter, while the average is $1\frac{1}{4}$ in. We should expect *that* ovary to provide more than the normal, one ovum at a time.

It is quite evident that, if the amount of ovarian tissue

capable of supplying ova is increased in amount, we must expect an increased production of ova. So that unusually large ovaries lead to an unusually large number of ova being supplied, and this extra or "superior development" of the sexual glands is in my experience undoubtedly inherited;[1] there are, indeed, many reasons for believing that this excessive uberty was formerly the rule, while the degree of comparative infertility of modern woman is a result of the constant repression of her natural instincts, a sacrifice of her health on the altar of fashion and financial convenience.

Hellin, quoted by *Whitridge Williams*,[2] discussing multiple pregnancy, states that "the ovaries of women who have had a number of multiple pregnancies contain an excessive quantity of ova." Accordingly, "the condition is probably due to the maturation each month of several ova, instead of one, as is generally the rule." And I here recall that normally the right ovary is practically always a *little* larger than the left, and thus, supplying rather more right or male ova, we get the normally slightly higher birth-rate of 106 boys born compared to 100 girls.

That it is the woman who is responsible for plural pregnancies is clearly shown by the following case reported by *Vortisch*[3]: A woman by her *second* husband gave birth to sextuplets, 5 boys and 1 girl; by her *first* husband she "had previously given birth to twins, quadruplets, and triplets in successive pregnancies." That is, 15 children in four pregnancies. The maternal origin of multiple births is thus evident, there being two different husbands.

This contention is borne out, too, by the cases we frequently read of, the woman having twins, or other form of plural pregnancy, repeatedly; thus *Dr. Lloyd Roberts*,[4] in 1893, related a case of a woman having twins fifteen times. In my own practice the following cases have come under notice: A woman, Mrs. M. McL., had twin boys seven times over, besides four single male births—*i.e.* 18 boys—and oddly

[1] It is comparable to the high egg-laying strains of fowls, for hens which lay from 260 to 290 eggs per annum can now be obtained.

[2] W. Williams, *op. cit.*, 1913, p. 369.

[3] Quoted in "Journ. Obstet. and Gynæcology," July 1904, vol. vi. p. 53.

[4] "Lancet," August 1893.

they were preceded by 6 girls before a boy was born. She had 24 children in all.

Mrs. T. W. had twins on three occasions, two boys each time; while Mrs. J. B. and Mrs. A. P. both had twins (boy and girl) on two separate occasions. Mrs. W. A. T. was delivered, in 1912, by me, of triplets, two girls and a boy, followed eighteen months after by twin boys.

Dr. G. H. Napheys[1] records a case where a woman had for her first child a girl, followed by twin boys on four occasions, making 9 children in all; while *Dr. W. R. Dix*[2] reported a case of a Mrs. M., aged thirty, having twins twice over, her mother having also had twins twice, her sister twins once, and her aunt twins once.

Baudouin[3] reported 14 boys in three deliveries: first triplets, then quintuplets, followed by sextuplets. All the children were males!

Other recorded cases are seven times twins and two single births; or from Anvers, near Neuchâtel, a case of four times twins, followed by triplets; or the case at Belgrade of triplets followed by sextuplets; or from Madrid, triplets followed by quintuplets.

The above cases all therefore support the view that plural pregnancy is due to maternal causes.

The only recorded case I have been able to find definitely pointing to the father as the cause was mentioned in the "Lancet."[4] It is the historical, unique, and probably apocryphal case, dating from 1753, of the Russian peasant Kinlow. He was twice married, and had 72 children; though Dr. Napheys,[5] who also mentions this case, gives the number as 90 children! He had 57 children by his first wife, four times 4 infants, seven times 3, and ten times 2 at a birth. By the second wife he had triplets once, and twins six times. This astonishing case seems to point to the husband or male being responsible; it is quite the exceptional case, however.

[1] Dr. G. H. Napheys, "The Physical Life of Woman," 1872, p. 134.
[2] Dr. W. R. Dix, "Brit. Med. Journ.," Jan. 9, 1904, p. 75.
[3] Baudouin, *loc. cit.*
[4] "Lancet," Jan. 28, 1905, p. 243.
[5] Napheys, *op. cit.*, 1872, p. 133.

Among cows and sheep plural births are not a very uncommon occurrence, but certain *individual* animals are well known nearly always to have more than the normal single offspring. They have probably extra well-developed ovaries. With sheep, twins very often are born, but some have three or even four lambs at a birth. Mares rarely have more than one at a birth.

A case of triplets, recently delivered in this neighbourhood, confirms *Saniter's* opinion; the triplets were all three boys with only two placentæ.

The first two boys, footling born, being uniovular twins, were followed by their single placenta, the cords being inserted two inches apart, the third boy, breech born, being duly followed by his placenta. There were thus only two ova fertilised, one giving rise to twins and one to a single birth, and the right ovary must have supplied them both.

CHAPTER XIX

DOES A DISEASED OVARY LEAD TO DISEASED CHILDREN?

IT is a remarkable fact that in many families containing both boys and girls we find that all the children of one or other sex are in some way or other affected: they may be physically affected or deformed, or else mentally deficient; while the children of the other sex are quite normal.

The following cases of insanity are very remarkable, and are more than coincidences:

Mrs. W. had 5 children, thus: 1st a boy, 2nd a girl, 3rd a girl, 4th a boy, 5th a boy. The three sons are all mentally very deficient, two are idiotic, and one quite insane. The two girls are quite sane.

Mrs. P. had 5 children: 1st a boy, 2nd a boy, 3rd a girl, 4th a boy, 5th a boy. The four sons are healthy and quite sane. The daughter is an idiot.

Mrs. S. had 3 children: 1st a boy, 2nd a girl, 3rd a boy. The two sons are insane; the girl is quite sane.

Note that the unhealthy or abnormal children do not follow each other; the birth of normal children of the opposite sex takes place between them.

The following remarkably confirmatory case I take from the "Lancet," June 7, 1902:

Drs. Keraval and Raviart report a case of insanity *in twin brothers* who had for many years lived quite apart from one another. The mother of the men was alive and well. Neither men had had syphilis, and both were temperate in their habits. Both were married. The special interest of the case lies in—

(1) The twinship of the brothers.
(2) The absence of hereditary antecedents of insanity.
(3) The freedom from syphilis and alcoholism.
(4) The fact that both were married and fathers of children.

It will be observed that the two patients were of the same sex, and hence had been derived from ova from the same ovary—evidently the right.

In these cases the children derived from one ovary only are deaf and dumb:

Mrs. F. had 3 children—1st a girl, 2nd a girl, 3rd a boy—in this order. Parents were not related before marriage. The two girls are normal; the boy is deaf and dumb.

Mrs. G. had 7 girls and no boys. Parents not related or deaf and dumb. All the girls are deaf and dumb

In these cases the children of one sex are blind:

Mrs. M. L. R. had 4 children: 1st a boy, 2nd a girl, 3rd a girl, 4th a boy. Parents not related. Both boys born blind; both girls all right.

Mrs. S. had 4 children: 1st a boy, 2nd a boy, 3rd a girl, 4th a girl. Both boys born blind; both girls all right.

In this case convulsions occurred only in the boys:

Mrs. K. had 16 children, 12 boys and 4 girls, thus: First 3 boys, then 2 girls, then 5 boys, then 2 girls, then 4 boys. The four girls are *all* alive and have had *no* fits. *All the* twelve boys *have had fits;* seven boys died actually during a fit, the eighth just after one concluded: he had had several.

We thus see that a succession of defective children is broken by the birth of a child or children of the other sex; and this should be noted, that the affected children are separated chronologically by healthy ones of the other sex, showing the cause of the imperfection is not a temporary one due to mental distress, or illness, or "maternal impression" on the mother's part; nor can it be some general blood disorder—*e.g.* syphilis—or else the children of both sexes would be similarly affected. No, some local cause: I say the ovary of one side must yield defective ova.

In the following cases the children of one sex only are left-handed:

Mrs. H. H. Parents not related, and neither left-handed. First child, girl, not left-handed; second, twin boys, both left-handed.

Mrs. H. C. had 7 children: 4 boys, 3 of them left-handed; 3 girls, none left-handed.

In the following case the female children both had hare-lip, the boy was unaffected:

Mrs. S., no relation to her husband, had 3 children: 1st a girl, hare-lip; 2nd a boy, normal, no hare-lip; 3rd a girl, hare-lip. This case is interesting, as hare-lip is twice as common in boys as girls.

All the above cases lead one to inquire, does a diseased condition of one ovary which does not prevent ovulation, and which is possibly not even recognisable by the microscope, lead to the production of ova which are imperfect or diseased?

In cases of syphilis it is admitted that the ova may be affected before they are impregnated even; and though this disease would affect the ova in both ovaries, yet it is justifiable to suppose that one ovary may be affected by some congenital peculiarity or disease, not a blood disorder, which would be unilateral in its effects. Thus, while not arresting ovulation from the ovary, the ova when fertilised would lead to a diseased or structurally deficient child.

Such is probably the explanation of the case described by *Tarnier* and *Budin*[1] of a woman who—

"gave birth alternately to living and dead children. The first child was living and healthy, the second dead, and so on, until the tenth pregnancy. It was born alive, however."

In the following case, reported by *Dr. H. R. Andrews*,[2] a woman, L. S., aged 36, with no history of syphilis, gave birth to twins prematurely—a girl and a boy.

"A living female child was born, followed by a placenta which presented no abnormal macroscopical appearance. A second bag of membranes was ruptured, and a male child was born, followed by an enormous placenta. The male child was still-born, it was universally œdematous and dropsical. Its placenta was very large, pale, œdematous, soft and friable."

As the two placentæ were entirely separate, we know that the two ova fertilised were also separated ones, and as the sexes were different I ascribe one to each ovary (the

[1] Quoted by Hirst, *op. cit.*, p. 179.
[2] "Trans. Obstet. Soc.," vol. xliii. 1901, pp. 169-71.

commonest mode of origin for twins). One child, the female, however, was normal, while the other was abnormal, showing that the diseased condition of the male child was not due to a general diseased condition of the mother or of her womb, or else both children would have been similarly affected, as they would have probably been had both been derived from the same ovary. Thus we have proof of the origin of a *healthy* child with a healthy and separate placenta from *one* ovary, while the ovum from the *opposite ovary* was evidently *diseased*, and so, though fertilised, a diseased child and placenta followed as a consequence.

The case, therefore, supports the theory that one ovary may yield imperfect or diseased though fertilisable ova, which very early show their effects by a diseased condition of both child and "after-birth."

The following cases seem to show that the ova may be so imperfect from an ovary, which to all appearances is normal, that the children from that ovary always die:

Mrs. B. had 6 children—3 boys followed by 2 girls, then a boy. Both girls died shortly after birth. The boys all lived.

Mrs. W. by her first husband had 4 children—3 boys who all died, and a girl who lives. By her second husband she had 4 children—3 boys who all died, and a girl who lives.

This hardly seems a case of coincidence, or as due to the greater infantile mortality of males.

Mrs. P. had 3 boys, 5 girls. All the girls died in infancy.

Mrs. L. had 6 boys, all died, 3 girls lived, thus—

1st, boy, died.	2nd, girl, lived.
3rd, boy, died.	4th, girl, lived.
5th and 6th, boys, died.	7th, girl, lived.
8th and 9th, boys, died.	

In the following cases the ova are imperfect, and lead to delicate children, who do not necessarily die, but they remain the delicate ones of the family, thus—

Mrs. L. S. had 5 girls, 1 boy. The girls are all strong and healthy. The boy is very delicate; he was the fourth child born, so that two healthy girls succeeded him.

Mrs T. had 5 boys, 1 girl. The boys are healthy and strong. The girl was deformed and a cripple, and has since died.

Mrs. M. had 4 boys, 1 girl. The boys are healthy and strong. The girl, the third born, is delicate; her two younger brothers are very healthy.

Mrs. C. L. had first a girl insane, then 5 boys all healthy, then lastly girl, delicate, died of phthisis.

This diseased condition of the ova is supported by the description by *Dr. Mary Dixon Jones*[1] of fatty and colloid disease of the *ova in the ovary*, so that—

"In advanced cases not a single healthy ovum is found in the whole ovary."

We can thus see that in some cases a few of the ova may be perfect while the majority are affected.

Mrs. W. B. had 6 children—1st, 2nd, 3rd, boys all deaf and dumb; 4th a girl, normal; 5th a boy, not deaf and dumb; 6th a boy, deaf and dumb.

It will be seen that the female child was healthy, and all the males, with one exception, were deaf and dumb; so that the majority of the male ova were diseased or imperfect. That the condition was not due to "maternal impression" is evident from the fact that one healthy boy was born between two deaf and dumb ones.

Mrs. C. C. had 8 children—1st, boy, normal; 2nd, boy, deaf and dumb; 3rd, boy, normal; 4th, boy, deaf and dumb; 5th, girl, deaf and dumb; 6th, girl, normal; 7th, boy, normal; 8th, girl, normal.

C. J. Bond reported in the "Lancet," August 1905, a case where healthy parents had 14 children—thus: First 3 girls, normal; then 6 boys, all deaf and dumb; then 4 more girls, normal; and lastly a normal boy.

The following very interesting case also supports this view, of one healthy ovary, and the other ovary containing only a small proportion of healthy ova.

Dr. J. W. Ballantyne[2] describes the case of a woman who had her children thus—

[1] Dr. Mary D. Jones, quoted by Macnaughton-Jones, *op. cit.*, pp. 654, 657.

[2] Ballantyne, "Journal of Obstetrics and Gynæcology," vol. ii., Dec. 1902, p. 529.

1st, boy, living; 2nd, boy, living; 3rd, abortion, 2nd to 3rd month (probably male).
4th, girl, hydrocephalic, dead.
5th, girl, normal, living.
6th, girl, anencephalic, dead.
7th, girl, "delicate," died at 5 weeks.
8th, girl, deformed and premature, died 3 days old, commencing hydrocephalus.
9th, girl, normal, living.

Here we have the male children normal and living, followed by the birth (with an abortion between, which was possibly a male embryo) of six female children, only two of which were normal and lived.

Of the remaining four, three at least were monsters, whilst the fourth, of which few particulars appear, was "delicate from the first" and soon died.

Surely some local as distinct from general condition must have accounted for this string of female monstrosities. I ascribe it to defective ova in one of her ovaries—the left.

Hegar reported a case of removal of a malignant tumour of one ovary, subsequent pregnancy, and birth of a deformed child; the remaining ovary also being *then* found to be sarcomatous and inoperable. Here both ovaries are diseased, and though an ovum is fertilised, yet the child is born deformed, so that the diseased ovum from the diseased ovaries, *which* is not stated, gave a diseased child.

Dr. Ballantyne[1] reports a case where a woman had 1st child, girl, deformed (spina bifida); 2nd and 3rd children, boys, normal and healthy; 4th child, girl, deformed (iniencephalic monster).

This case looks as though the left or female ovary had supplied diseased ova, the healthy males being born, in between the deformed female ones, from healthy ova from the other or right ovary.

In a case of my own, Mrs. R. had first a girl, healthy; then a boy with spina bifida; then another girl, healthy. Here a deformed male appears between two normal females.

Dr. J. E. Blomfield reports in the "British Medical Journal," April 11, 1903, a case of a woman who had two children, two years or so apart. Both were boys, and both

[1] "Manual of Antenatal Pathology: The Embryo," p. 273, 1904.

were malformed in an almost identical manner. Surely here the right or male ovary had provided abnormal ova on the two occasions.

Dr. Robert Hutchison[1] reported a case of twins, with male child healthy, and the female achondroplasic.

J. Howell Evans[2] has recorded a case where the girls were affected with helical fistulæ and accessory auricles, while the sons were quite normal.

And a patient of my own, Mrs. C. B. D., had two girls who were identically deformed, having only a little finger and diminutive thumb on each hand, and only the little and big toe on each foot. She had no son.

In the following extracts we see that both *Kossmann* and *Marchand* credit diseased ova as occurring in the ovaries, and prior to fertilisation. Thus, *Dr. R. Andrews*[3] quotes *Kossmann* as—

"noting the frequency with which the ovaries present some abnormal appearance in cases of tubal pregnancy, and suggesting that these pathological ovaries may have supplied pathological ova."

And similarly *Marchand*, quoted by *Dr. Cuthbert Lockyer*,[4] says:

"The influence of the maternal organism makes itself felt upon the ovum in the ovary, the latter transmitting any peculiarities it may possess to the developing ovum. These tendencies to disease show themselves during the development of the ovum *in utero*. Twin pregnancies, in which one ovum develops normally and the other degenerates into a mole, afford an argument in favour of the view that the diseased ovum acquired its pathological tendencies whilst it was within the ovary. That ova may be primarily diseased seems very probable."

I should maintain that the healthy child in such a twin pregnancy usually came from one ovary, while the diseased one came probably from the opposite ovary; though it is possible to have some healthy and some unhealthy ova in the same ovary, as in a case reported by *Birnbaum*[5] and quoted by Dr. Stevens, where a woman in a twin pregnancy had

[1] "Proc. Roy. Soc. of Med.," December 1909, vol. iii., p. 41.
[2] *Ibid.*, January 1909, vol. ii., p. 102.
[3] "Journal of Obstetrics and Gynæcology," vol. iv., Sept. 1903, p. 290.
[4] "Trans. Obstet. Soc.," vol. xlv. 1903, p. 495.
[5] "Journal of Obstetrics and Gynæcology," vol. v., May 1904, p. 475.

"a vesicular mole and a healthy fœtus," so that one ovum was diseased and one healthy. Post mortem both corpora lutea were in the same, the left ovary; and whilst one of these was quite normal the other was diseased—proof indeed that one ovary can give both healthy and unhealthy ova.

Most abnormalities are commoner in male than in female children—*e.g.* colour-blindness affects the male sex almost entirely, as also does double hare-lip; but congenital dislocation of the hip is, *Dr. Tubby*[1] states, "seven times as common in females as in males." For further details of variations in the respective liability of the sexes to other abnormalities I refer the reader to *Dr. Havelock Ellis*, "Man and Woman," chap. xvi., though he does not specify any cause therefor.

It is evident that the condition of health or want of health in a woman more or less affects all her organs, and therefore her ovaries and their contained ova are influenced by her state of health or disease; hence the first step in eugenics must be the improvement of the general health of the mother, so that her ova are quite healthy.

Certainly this subject of the deformity, disease, or death of all, or most, of the children of one sex in a family, the children of the other sex being perfect, opens up a wide field for investigation.

[1] A. H. Tubby, "Clinical Journal," July 1, 1903.

CHAPTER XX

HERMAPHRODITISM

THE subject of hermaphroditism has very shortly to be considered in connection with this inquiry into the cause of sex.

True hermaphroditism may be defined as the presence in one individual of the reproductive organs of both sexes, in a condition of functional activity.

In this strict sense of the term, hermaphroditism is a condition which does not exist in the human species, for, as *Sir J. Bland-Sutton*[1] says—

"no example has yet been recorded in the human family of a functional ovary coexisting with a functional testis."

Many individuals are born in whom the external genitals are so imperfectly developed and deformed that it may be difficult to say to which sex they belong; they certainly do not possess the complete and active sexual organs of both sexes, and so are not true hermaphrodites: they are known as false or pseudo-hermaphrodites—the "Will-Jill" of the laity. These false hermaphrodites may appear to possess the genital organs of both sexes, but they do not really do so.

Dr. G. F. Blacker[2] says:

"If functional activity for the two kinds of glands is insisted upon, it is most unlikely that any case of true hermaphroditism will ever be met with in man."

So that we may say that the true test of a female is the presence of functional ovaries, of a male the presence of active testicles, and the malformed external genitals of the pseudo-hermaphrodite are no guide to the nature of the internal generative organs.

[1] "Diseases of Ovaries," 1896, p. 7.
[2] Blacker, "Trans. Obstet. Soc.," 1896, p. 265.

If in conjunction with modified external genitals there be a female gland on one side and male on the other, then one or other set are functionless, so that one or other characteristic predominates; hence the *pseudo-hermaphrodites are either male or female*, and though they are generally sterile they are certainly not a third sex; had they been, I should have expected there to be a third ovary, possibly situated in midline of body; but such an occurrence is quite unknown.

A pseudo-hermaphrodite is an abnormality due to a developmental error; the condition is not confined to the human species, but occurs in some animals, especially in pigs, cows, and goats.

It is a remarkable fact that a cow calf twin-born with a bull calf is frequently a pseudo-hermaphrodite, and is *often* but *certainly not always* sterile: it is popularly known as a "free-martin." On the assumption presumably that what applies to the vertebrata must also always apply to women—an assumption which I strongly deprecate and deny—it has been believed by many that the girl twin-born with a boy would also be a free-martin and sterile. Such, however, *is not a fact*, and there are abundant cases on record of women in cases of pigeon-pair twins being fruitful and bearing children.

In one instance with which I am acquainted, a woman twin-born with a man had had nine children, four boys and five girls; while in another case both the man and woman twin-born had children of both sexes when they married, showing that neither brother nor sister was sterile. Further, in "The British Medical Journal" of November 1902, p. 1691, a case is mentioned of a man, the co-twin of a woman, marrying a woman who was the co-twin of another man—*i.e.* the man and woman of two different pairs of pigeon-pair twins married and had a child; which also conclusively shows that neither child in a case of different sexed twins is necessarily or even usually sterile: cf. also "The British Medical Journal," November 29, 1902, and December 20, p. 1940. Most human pseudo-hermaphrodites are single births; I have found no example of twins being both hermaphrodites.

It is evident, from the fact to which I have called attention —viz. that the child is born with definite sexed ova already in her ovaries—that the idea that the early condition of the sexual organs in mankind is one of embryonic hermaphroditism can no longer be supported. It is partially disproved, too, from the fact that *Nagel* has distinguished the rudimentary testicle from the rudimentary ovary in an embryo of only five weeks' growth.

To enter into a minute description of the varying deformities and peculiarities of different false hermaphrodites is quite unnecessary, and to find a reason for their abnormalities of development does not come within the scope of this book, neither would it help to solve this question of the cause of sex.

CHAPTER XXI

CASES THOUGHT TO DISPROVE THE THEORY

AMONG the disbelievers of my theory the greatest reliance in supporting their scepticism has been placed on those cases (after all only a quite small number) in which an ovary or an ovarian tumour has been removed by operation, and the woman has subsequently given birth to a child, whose sex corresponded to the ovary which had been removed. In a few cases a woman has even had twins, boy and girl, after the removal of one ovary.

It is, of course, at once evident that one part of my theory of the causation of sex entirely fails if this rare occurrence cannot be fully explained.

The explanation is, shortly, that it is very difficult, and often impossible, to be sure that all ovarian tissue has been removed by the operation of taking away an ovary or an ovarian tumour.

It is not usual to remove normal ovaries, but even when removing an apparently normal ovary it is quite easy to leave a portion of ovarian tissue in the stump or pedicle—*i.e.* in the ovarian or utero-ovarian ligament which runs from the ovary to the side of the uterus. This ligament is normally about an inch to an inch and a quarter long. I have seen one of the most experienced of abdominal surgeons unintentionally leave ovarian tissue in the pedicle when doing hysteropexy, the normal ovary being removed to facilitate reposition of the uterus.

Mr. Alban Doran[1] states he had "more than once detected ovarian tissue in the ovarian ligament close to the uterus and far from the anatomical ovary," so that though the anatomical ovary be removed, some ovarian tissue is still left behind in the pedicle stump.

[1] "Trans. Obstet. Soc.," vol. xlvi., 1904, p. 102.

If the pedicle be long, owing to stretching and dragging out of the ovarian ligament by a tumour, we cannot say *how far along it* ovarian tissue extends, and so we are quite likely to leave some ovarian tissue in it when we divide it to remove the tumour; if the pedicle be short, as *Doran*[1] says, "the operator rightly dreads slipping of the ligature, and so is apt to make it too long and leave a piece of ovary behind."

Dr. J. Halliday Croom[2] confirms this: he says, "it is often difficult to state for certain that the whole of the ovary has been removed; a small portion may be left in the pedicle."

In cases of ovariotomy performed during pregnancy, *Dr. W. Walter*[3] says—

"the closer to the uterine wall the pedicle was ligatured, the greater the chance of irritation (of the uterus) resulting in miscarriage, *hence* the pedicle was secured as far from the uterine wall as safety permitted."

Here we see a reason why ovarian tissue is sometimes left behind in the pedicle, and a case published by *Baldwin*[4] proves it. The patient was pregnant. She had two ovarian cysts, which—

"had become adherent, but the tumours were distinct, and each had quite a long pedicle. Owing to the known fact of her pregnancy, care was taken to avoid any manipulation of the uterus."

The tumours were removed.

She has had two other children since the operation, but the sex is not given.

It is evident that *some ovarian tissue was not removed*, for though both ovarian tumours were removed, she became pregnant twice after the operation, and I maintain that those children were of the same sex if the ovarian tissue was left on one side only; had some been left on *both* sides, then it is possible she had children of both sexes—that is, either pigeon-paired twins, or else male and female children at

[1] Doran, "Journal of Obstetrics and Gynæcology," vol. ii., 1902, p. 7.
[2] Halliday Croom in "Allbutt and Playfair's Gynæcology," p. 343.
[3] Dr. W. Walter, "Journal of Obstetrics and Gynæcology," January 1903, vol. iii. p. 93.
[4] Baldwin, *op. cit.*, vol. iii., March 1903, p. 264.

different times—after the double or bilateral ovariotomy had been performed.

In the following case, reported by *Dr. R. Stansbury Sutton*,[1] the patient had an ovarian tumour on each side. Double ovariotomy was performed, *i.e.* both ovarian tumours were removed.

"This operation was done on October 20, 1892. On June 10, 1894, the patient gave birth to a male child. Again, on February 25, 1896, she was delivered of a male child."

Therefore a portion of an ovary *must* have been left behind in the abdomen, and of whichever ovary it was (I maintain it was a portion of the right ovary) the fact remains, that that portion of ovary "bred true,"—that is, it yielded two boys, not first a boy and then a girl. This surely cannot be looked upon as a coincidence.

In another case, Dr. Balding, after ovariotomy by Spencer Wells (whether bilateral, or which side is not mentioned), delivered a patient of male triplets—not two boys and a girl, note. That is, the ovary not removed yielded three children, *all the same sex*. I contend that either only the left ovary was removed, or, if both were supposed to be taken away, a piece of the right ovary was allowed to remain.

Here it will be well to call attention to a paper by *Dr. J. H. Dauber*,[2] who therein shows conclusively the reason why patches of ovarian tissue are often to be found in the ovarian ligament, and also he suggests sometimes in the ovario-pelvic ligament. It is due to traction on the ovaries, during development, by the muscle fibres in the ovarian ligaments.

Besides being situated in these ligaments, there is very strong reason to believe ovarian tissue is sometimes to be found in between the layers of the broad ligaments, and unconnected with the ovarian ligaments, or ovary.

Dr. Dauber[3] corroborates thus:

"It is generally believed either that accessory ovaries, or additional patches of ovarian tissue, like accessory thyroids in the neck, may exist in the broad ligaments";

[1] Dr. R. S. Sutton, "Geneva Gynæcological Congress," September 1896; and "Trans-American Gynæcological Society," 1896, p. 105.

[2] Dr. J. H. Dauber, "Lancet," Jan. 28, 1905, p. 224.

[3] *Loc. cit.*

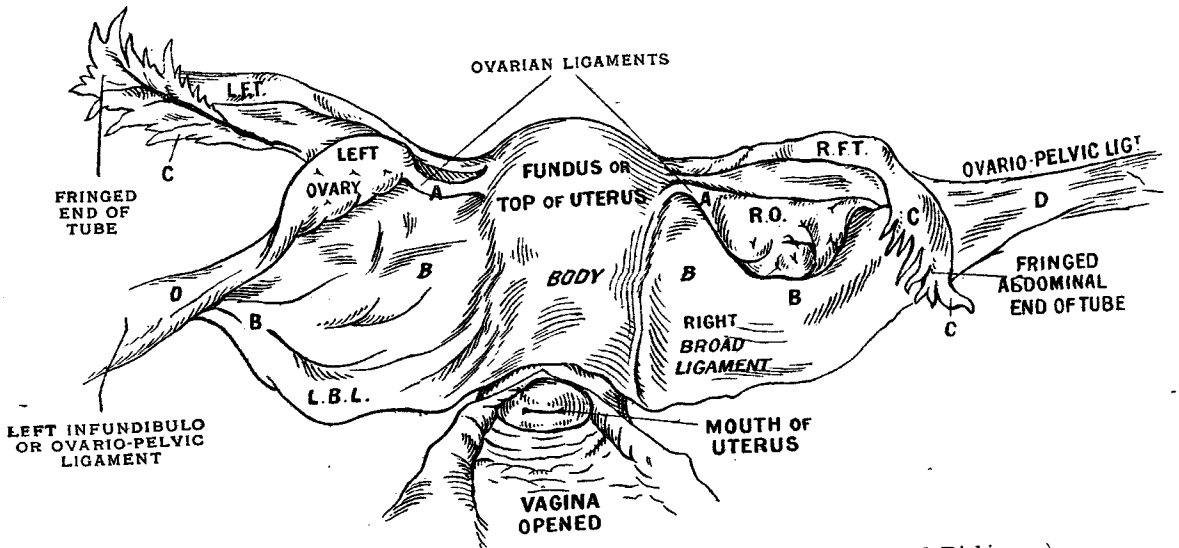


FIG. 20.—POSTERIOR SURFACE VIEW OF UTERUS. (Modified from Norris and Dickinson.)

Shows its investment by the peritoneum, forming at the sides of the uterus the right and left broad ligaments, the top edges of which, running from the ovaries to the bony side wall of the pelvis, form the ovario-pelvic ligaments. R.F.T. and L.F.T. Right and Left Fallopian Tubes, the left stretched out. L.B.L. Left Broad ligament. R.O. Right Ovary: both ovaries are displaced for sake of clearness; both show ovulation scars.

Sites where accessory masses of ovarian tissue may occasionally be found are shown:

A, in the Ovarian Ligament; B, in either Broad Ligament, between layers; C, in a Tubal Fringe; D, in the Ovario-pelvic Ligaments.

and a case reported by *Baldwin*[1] proves this conclusively:

"On July 15, 1893, both ovaries and tubes were removed. No adhesions were encountered. Sixteen months later, in November 1894, careful examination revealed a small mass of tissue to the left of the uterus. When this was pressed upon, a sensation was experienced similar to that caused by pressure upon an ovary."

The abdomen was again opened:

"This mass of tissue, which was between the layers of the left broad ligament, and apparently just below the remains of the ovarian ligament, was identified and removed. It was about the size and shape of a small Lima bean, and presented all the characteristics of ordinary ovarian tissue. No other ovarian tissue could be found at any other point, and the abdomen was closed. Menstruation continued, however, showing that some ovarian tissue still remained somewhere."

Let it be noted that both ovaries are definitely stated to have been removed, yet ovarian tissue was *found and removed from between* the layers of the left broad ligament; but in spite even of this, "some ovarian tissue still remained," as evidenced by the return of menstruation.

I have therefore now enumerated three possible anatomical sites in which ovarian tissue may sometimes be found independently of the true ovary, and therefore the removal of the whole ovary or the whole of an ovarian tumour, on both sides, does not invariably prevent a subsequent pregnancy.

And now we must consider the possibility of a supernumerary ovary.

An extra or third true ovary, having the size, shape, and activity of the normal organ separated from it, and in association with a third Fallopian tube, is quite unknown.

Accessory ovaries, however, do occur, but not with the frequency which *Beigel* claimed for them.

They are, *Dr. J. W. Ballantyne*[2] says, "probably constricted portions of the normal organs which have been separated at an early period in the development"; they

[1] Baldwin, "American Journal of Obstetrics," December 1902, quoted in "Journal of Obstetrics and Gynæcology," vol. iii., March 1903, p. 265.

[2] Ballantyne, "Allbutt and Playfair's System of Gynæcology," 1906, pp. 130, 131.

occur, he says, in " 2 to 3 per cent. of post-mortem examinations." In rare cases, " the ovary has been found divided into two nearly equal parts by such a constriction."

Sir J. Bland-Sutton[1] has always denied the existence of a true third ovary. He admits of ovaries so deeply fissured that a " portion of the gland is almost isolated," and the ovary " seems to consist of two parts united by a narrow isthmus."

Hence it must be possible for an ovarian tumour to develop in one part and not the other, and by its weight and traction to gradually elongate this isthmus, so that, when operated on, the isthmus between the two isolated parts is divided by scissors instead of the true ovarian ligament, and therefore a piece of ovary proper is left behind, though the whole ovarian tumour is claimed to be removed.

A case reported by *Dr. Galabin*[2] is very corroborative. Two portions of the ovary, one containing a tumour, were separated by three-quarters of an inch of ovarian ligament. The portion nearest the uterus was the unaffected portion; " on the ovarian ligament, close to the angle of the uterus, another ovary was seen "; then, three-quarters of an inch further along the ovarian ligament, the " outer portion of ovary had become cystic." This was removed, the healthy portion remaining untouched.

Hence, the complete removal of this ovarian tumour would not be synonymous with the complete removal of all ovarian tissue.

Mr. Alban Doran[3] reports a reliable case of accessory ovary. He says:

" In one ovarian ligament I found an accessory ovary, a condition which may, in some cases, explain the persistence of menstruation and the possibility of normal pregnancy after the removal of both ovaries in operations for ovarian tumours, inflammatory disorders of the appendages, and ectopic gestation."

That it was a true additional mass of ovarian tissue was proved by *Dr. Cuthbert Lockyer*, who examined it micro-

[1] Bland-Sutton, " Diseases of Ovaries," 1896, p. 25.
[2] Dr. Galabin, " Trans. Obstet. Soc.," vol. xliii., 1901, pp. 268, 269.
[3] Alban Doran, " Trans. Obstet. Soc.," vol. xlvii., 1905, p. 384.

scopically. *Dr. J. W. Ballantyne*[1] has found an accessory ovary which had ovulated "at least once, for a cicatrix was found."

A further case is recorded by *Dr. W. P. Manton*, of Detroit, in the "St. Louis Medical Review," January 1906. He describes the case as a third ovary, which was found beneath the peritoneum of Douglas's pouch:

"The patient was a woman from whom one ovary had been removed and the other one resected. The third ovary was about one inch long and three-quarters of an inch wide. It had always been very sensitive to pressure, and apparently gave rise to backache. It was removed on the occasion of a second operation, and since that time the symptoms have been relieved. Microscopical examination showed that the structure had typical ovarian stroma, and contained a few degenerated Graafian follicles."

It is very doubtful if this was a true third or supernumerary ovary. It was probably an additional patch of ovarian tissue, or accessory ovary.

We are forced, therefore, to believe in the very occasional presence of an accessory ovary, quite apart from fragments of ovarian tissue which may be left behind, either in the ovarian ligament or elsewhere, when attempts are made to remove ovarian tumours, more especially in those found to be bound down by adhesions. And this supplies another anatomical reason for the occasional occurrence of the birth of a child after unilateral ovariotomy, whose sex agrees with the ovary thought to be removed. The sceptic may claim that the child came from the untouched ovary, but this fails him when *both* ovaries have been removed; we then have direct proof that all ovarian tissue has not been removed, because ovulation *must* have occurred to permit of pregnancy.

Another reason why ovarian tissue may be left behind, *Sir J. Bland-Sutton*[2] says, is:

"The ovaries may be so firmly fixed to the floor of the pelvis that they break, and portions of ovarian tissue are left; this often impairs the subsequent results, as menstruation (and ovulation) continue if only a small portion of an ovary is left."

[1] *Loc. cit.*, p. 130.
[2] Bland-Sutton, "Diseases of Women," 1904, p. 485.

Dr. Cullingworth[1] reports a case which is an example of this:

"The much enlarged right ovary with the Fallopian tube . . . were removed. The appendages of the opposite (left) side were then separated; during the process rupture of the (left) ovary took place. The (left) tube and ovary were removed, the greater part of the ovary remaining as part of the pedicle."

On examination of the parts removed—

"The left Fallopian tube was beaded from kinking, but was otherwise healthy. No ovarian tissue was found in the parts removed on the left side."

So that the removal of this left ovary was a complete failure; not only did the left ovary break, but the "greater part of it remained in the pedicle," and not even a portion of the left ovarian tissue could be detected as having been removed, with its accompanying left tube, and this in spite of the statement that "the (left) tube and ovary were removed."

The patient recovered from the operation, since when "menstruation has been regular," because of the incomplete removal of all ovarian tissue.

Olshausen (see Chapter X., p. 80) *performed bilateral ovariotomy. At the post-mortem he found that neither ovary had been removed!*

As ovarian tissue can be left behind when operating on one ovary, so too it can occur if both ovaries are removed; it is even possible that a piece of ovarian tissue might remain on both sides, so that boy and girl twins *might* be born after double or bilateral ovariotomy! though I know of no case.

There are on record now a dozen genuine cases of pregnancy after double or bilateral ovariotomy; and we could not realise this were we not aware of the extreme difficulty, amounting to impossibility in some cases, of completely removing all ovarian tissue, more especially if there has been any inflammatory action of, or around, the ovarian tumour. And *Mr. Alban Doran's*[2] experience may here be quoted:

[1] Dr. Cullingworth, "Trans. Obstet. Soc.," vol. xxxiv., 1892, pp. 388, 389.
[2] A. Doran, "Trans. Obstet. Soc.," vol. xliv., 1902, p. 249.

"When the base of the cyst burrowed and lay close against the uterus the ovarian ligament could rarely be distinguished. In one case, where Mr. Doran was obliged to remove the uterus, with the burrowing adherent tumour, he found, on examining the specimen, that it would have been *practically impossible to leave the round ligament or part of a pedicle without leaving also ovarian tissue, morbid or healthy*. As it was with a cystic tumour, so it was with inflamed adherent appendages, and so it very often was with an ovary removed to check the growth of a uterine fibroid."

The following cases too, quoted by *Sir J. Bland-Sutton*,[1] show the excessive difficulty in some cases of entirely removing both ovaries:

"*Dr. Angus Macdonald* attempted bilateral oöphorectomy on a young woman. He removed the left ovary and tube, but failed to find the right one. In March 1886, *Mr. Lawson Tait* tried to find

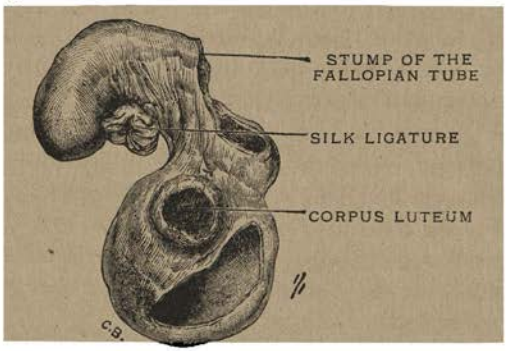


FIG. 21.—FRAGMENT OF OVARY CONTAINING A CORPUS LUTEUM LEFT AFTER A SUPPOSED COMPLETE REMOVAL OF BOTH OVARIES, ETC. (Bland-Sutton.)

the right ovary, but failed. He took away the fundus of the uterus. In spite of this menstruation continued. In 1890 *Dr. Keith* reopened the belly, found and removed the right ovary and its corresponding portion of tube. The patient recovered, and menstruation permanently ceased."

"*Mr. Martin* removed the uterus two years after removing both ovaries. He found that a piece of ovary had been left behind."

Dr. Amand Routh,[2] too, has stated "it is sometimes impossible to remove both ovaries completely."[2]

Pinesse concludes "that persistence of menstruation after the removal of both ovaries and tubes is due to portions of

[1] Bland-Sutton, "Diseases of Ovaries," 1896, p. 416.
[2] Dr. A. Routh, "Brit. Med. Journ.," October 1903, p. 801.

ovarian tissue left behind," and states that "in second operations corpora lutea were seen on the stumps of the pedicle left after the primary operations."

Sir J. Bland-Sutton[1] has the drawing on p. 165 illustrating this completely, a portion of ovary with a corpus luteum in it (evidence of ovulation) being shown. It was found at a second operation, and had been left after a supposed complete double oöphorectomy. He says:

"Such a retained portion of ovary is sufficient to maintain not only menstruation, but ovulation, and it will form corpora lutea."

Ovulation is *the* function of the ovaries; hence if all ovarian tissue be removed ovulation is arrested, the woman is absolutely sterile, and menstruation permanently ceases.

And here it will be well to inquire how much—or, rather, how little—ovarian tissue will be sufficient to ovulate, and thus lead to the birth of a child.

The ova being microscopic, we should expect from this that an exceedingly small portion only would be necessary, and this is what we find to be the case.

The following extracts prove it:

Dr. Galabin[2] showed tumours of both ovaries removed at the fourth month of pregnancy.

"The right tumour was a dermoid cyst containing gruel-like fluid, which solidified on cooling.

"The left tumour was an ordinary cystic adenoma, except that three small cysts in it were evidently dermoid. In the left tumour was seen a *large corpus luteum of pregnancy*, and near it a *small fragment of unaltered ovary*."

A paper, too, by *Dr. Condamin*,[3] of Lyons, on pregnancy in women suffering from large bilateral ovarian dermoids, shows how little ovarian tissue is requisite to give rise to a fertilisable ovum; and *Dr. Herman*[4] says that, "even in bilateral ovarian disease, so advanced that healthy ovarian tissue cannot be detected by the naked eye, the patient may become pregnant."

[1] "Diseases of Women," 1904, Fig. 126, p. 495.
[2] Galabin, "Trans. Obstet. Soc.," 1896, p. 101.
[3] Condamin, "Annals of Obstetrics and Gynæcology," March 1904, p. 188.
[4] Herman, "Diseases of Women," p. 763.

Further, *Sir J. Bland-Sutton*[1] says:

"Both ovaries may be so distorted and destroyed by dermoids that the true ovarian tissue is unrecognisable to the naked eye; yet these organs are not only able to dominate menstruation, but to discharge their egg-bearing functions successfully."

Again, he says, in a case where—

"*Bantock* performed double ovariotomy on a woman in the third month of pregnancy, both tumours were dermoid. He made a very careful microscopical investigation of them, but was unable to detect normal ovarian tissues."

Yet some normal tissue had provided the ovum that was fertilised in both *Dr. Bantock's* and *Dr. Galabin's* cases; so we see what an infinitesimally small portion of ovarian tissue, if left behind at an operation, or undamaged by tumour growth, is capable of yielding fertilisable ova—in fact, a single Graafian follicle is enough to accomplish the purpose.

In the following case *Lefas*[2] found:

"To one of the fimbriæ of the right tube was attached a little round tumour, *perfectly separate from any other structure*, besides the fimbriæ which formed its pedicle. Microscopically it was a true corpus luteum."

So this tiny piece of ovarian tissue, quite separate from the ovary, attached only to the abdominal end of the tube, had ovulated—so that pregnancy might have followed the removal of that ovary.

With what *Morgagni* said, "a woman may conceive if there remain as much of one ovary, sound, as belongs to one mature vesicle," we must therefore agree.

Confirmatory of the difficulty of affirming that no ovarian tissue had been left behind, are the remarks by *Dr. Eden* in the discussion of a case at the Obstetrical Society of London, March 2, 1904. He said:

"It was impossible to be sure, by simple inspection at the time of operation, that the whole of the ovary or ovarian tissue had been removed. Only careful microscopical examination by serial section of every small mass, elevation, or nodule—possible only after a post-

[1] Bland-Sutton, "Diseases of Ovaries," 1896, p. 61.
[2] "Journal of Obstetrics and Gynæcology," vol. i., Jan. 1902, p. 109.

mortem—could negative the existence of unremoved ovarian tissue lying in the ovarian pedicle or between the layers of the broad ligament."

Having thus seen how infinitely small the piece of ovarian tissue left behind may be, we must next point out that there are reasons to believe that these unremoved portions may grow, in much the same manner as does a tonsil stump after the removal of a portion of the tonsil.

Belief in the growth and development of these portions of ovary and their contained follicles was stated by *Dr. Amand Routh.*[1] He said:

"He thought it likely that a small piece of the hilum of one ovary might be left containing no Graafian follicles sufficiently developed to come immediately to maturity. He believed that such a piece of ovarian stroma, together with the follicles, became in a few months further developed, and ovulation and menstruation then recurred."

There are some specimens in the Royal College of Surgeons Museum showing the results of incomplete castration in cockerels, and they seem to strengthen the belief that portions of unremoved ovarian tissue may grow, for the glands in cockerels, if only partially removed, are reproduced, and the birds acquire the full male characters.

As a result of the appreciation of the fact that a portion of ovary is sufficient to ovulate, the operation of resection of an ovary has been introduced. This consists in cutting out the tumour or diseased part, and leaving the healthy remainder. This has been often done now, and with the best results, pregnancy having followed such an operation.

Besides pregnancy following as the result of ovarian tissue being left behind, either accidentally or intentionally as a result of resection of an ovary, we can also have tumours arise in the unremoved pieces.

Thus *Dr. Herbert Spencer*,[2] when discussing a case of pregnancy after incomplete bilateral ovariotomy, said he thought—

"that some portion of one of the tumours had probably been left behind in separating the adhesions. He had known an ovarian tumour develop after double ovariotomy from this cause."

[1] Dr. A. Routh, "Trans. Obstet. Soc.," vol. xliv. 1902, p. 248.
[2] Dr. H. R. Spencer, "Trans. Obstet. Soc.," vol. xliv. 1902, p. 247.

This leaving a portion of ovarian tissue, due to adhesions round a tumour, is evidently what had happened to *Dr. Spencer* when, in vol. xlii., p. 396, he announced the birth of boy and girl twins after he had "removed a left-sided ovarian tumour completely"; but which he also stated was "bound down by adhesions," when he described the case. So that case does not negative my theory.

Other operators have noted tumours arising in ovarian remnants. Thus *Mr. Alban Doran* has seen "an ovarian cyst develop on the distal side of a ligatured stump."

Mr. J. D. Malcolm,[1] in the "Lancet," reported four cases: in three bilateral ovariotomy had been performed, and a tumour grew on one or other side; in the other case the tumour recurred on the side the ovarian tumour was removed from. *Mr. Malcolm* stated that—

"some portion of the ovary had been left, and it was most interesting and important to know that a small piece of an ovary remaining in this way could give rise to an ovarian tumour."

We therefore see that *complete removal of an ovarian tumour is not synonymous with the complete removal of all ovarian tissue*, and my theory remains quite unshaken.

Although I have thus clearly shown that (*a*) portions of ovarian tissue may be left behind after operations; and further that (*b*) ovarian tissue in small detached pieces may occur some distance from the operation site, yet the general rule holds good that—the removal of the anatomical ovary on one side removes all the ovarian tissue from that side.

And the result is the birth of only one-sexed children after such an operation.

The two or three cases brought forward to the contrary disprove not my theory, for in these few exceptional cases who shall say some true ovarian tissue had not been left behind? or that there was no accessory ovarian tissue?

[1] J. D. Malcolm, "Lancet," Oct. 31, 1903; "Trans. Obstet. Soc.," 1893, p. 37.

CHAPTER XXII

THE ALTERNATE ACTION OF THE OVARIES

WE have seen that ovulation is a spontaneous, usually painless, unilateral process, and, I maintain, an alternate one.[1]

To prove that ovulation takes place practically alternately from the two ovaries, besides referring the reader to Chap. VI., p. 49, where I quote Négrier and give other proofs, the following facts should be conclusive:

From Chap. XI., p. 82, we learnt that each half of a double uterus has only one ovary attached thereto, so that we can be sure in such cases that *one ovary only* is associated with the menstruation from *one-half* of the uterus; for the two ovaries do not normally ovulate at the same time, neither do the two halves of a double uterus menstruate synchronously.

Négrier showed that, if both halves of a double uterus are fully developed, menstruation (the outward sign of ovulation) occurred from each half every alternate month—*i.e.* ovulation occurred alternately. *Engel*[2] narrated a case of double uterus, where the " two halves of the uterus

[1] This contention of alternate ovulation, as well as the whole theory generally, has been condemned by a very well-known consultant as " too mechanical." This seems a very inconsistent objection when we recall how essentially mechanical the whole of life is. Is not our very respiration mechanical in its regularity ? So, too, is our heart's action, and why the latter should be the more rapid of the two we know not, neither can we alter their respective rhythms. Disease, such as pneumonia, does so; but this is abnormal rhythm, and recovery soon leads to a return to the normal. Menstruation, too, has a mechanical regularity in its recurrence, which in many cases is quite marvellous, for most women can tell to a day, while some women to my own knowledge can tell to an hour almost, when their period is due.

Seeing, therefore, the essentially mechanical nature of the three important functions of respiration, circulation, and menstruation, we can hardly look upon this as a valid objection to the theory.

[2] Engel, quoted by Dr. A. Giles, " Trans. Obstet. Soc.," 1895, vol. xxxvii., p. 333.

menstruated separately"; while *Jurinka*,[1] quoted by *Dr. C. Lockyer*, writing on menstruation in double uterus, says: "Such uteri are functionally normal, the two halves alternating in the menstrual process."

Hence, as menstruation thus occurs alternately from the uterine halves, so also must the ovulations be alternate from the ovary attached to each half of the uterus, and thus alternate menstruation is indicative of alternate ovulation.

Now, if the two halves have coalesced (as is normal) to form the single cavity uterus, the respective ovaries will certainly alternately ovulate, and menstruation will now necessarily appear regularly each month from the single uterine cavity.

In the following case *Ballantyne*[2] quotes *T. A. Emmet* as recording a case of double uterus with one half imperforate: "There was a bimonthly menstrual flow from one half, while on the other side there is an imperforate condition of the horn," so that the ovary attached to the normal side ovulated every second month, as evidenced by the bimonthly menstruation; for, as *Strassmann* says: "Each menstruation is the expression of an ovulation."

The nearly equal birth-rate of boys and girls—viz. 106 to 100—proves that nearly an equal number of ova are provided by the two ovaries, so this further corroborates alternate ovulation, because we have seen that the two ovaries do not act at the same time. Bilateral ovulation is not normal, so they must act nearly alternately to insure a *nearly* equal number of children.

I have details of several cases of alternate good and bad menstrual periods.

Thus Miss U. M., age twenty-eight, for the last seven years at least has noticed that she has "alternately bad (*i.e.* painful) periods, followed by a good or painless one."

When she has a bad period she has "great" pains running down from the right iliac spine and down the right groin. The next period (the good or not markedly painful one) she "does not notice any of these right inguinal pains, though she has slight pain over the lower abdomen."

[1] Jurinka, "Journ. of Obstet. and Gyn.," vol. v., 1904, p. 174.

[2] Ballantyne in Allbutt, Playfair and Eden's "System of Gynæcology," 1906, p. 142.

This case points to ovulation (which is admitted to occur at or about a menstrual period, and to have its " external sign in menstruation ") being one month painless, but next month painful; and the pain being always over the right ovary points to the right ovary ovulating with pain one month, and the left ovary ovulating painlessly the month following.

As the pain shows an alternate monthly periodicity, we must conclude that the right ovary ovulates every alternate month.

Miss M. S., age twenty-seven. " Has a good period, then a bad one; then the next will be another good one." " The pain is always on the right side at the bad periods, never on the left."

She does not get two good periods running, so that we have bimonthly painful ovulation, with the pain always on the same side, the right.

Miss W. menstruates every thirty days. She has pain over the right ovarian region and down the right leg every second period. It is quite marked and different from the slight abdominal discomfort of the other times. These cases point to painful ovulation from the right ovary each alternate month, that from the left ovary being practically painless.

Mrs. J. J. has alternately painful periods. She has considerable pain in the left ovarian region every other month; the " other periods she is unaware of, except for the show." She has no pains then.

Miss T. T.'s periods are very regular, every twenty-eight days. There is always some pain, but every other period is a bad one, and she notices the pain is always worst over the left ovarian region at these bad alternate periods. She then has to keep her bed, and is often bad and unable to do her work for over a week. Her mother often says, " Never mind; you'll have a better time next time." At the good times the pain is slight and diffused over the abdomen; " at the bad times it is most severe, and is always most marked over the left ovarian region."

In these cases we have bimonthly excessive pains, always over the left ovary; at the other times it is diffused over the

abdomen, and is only slight, pointing to markedly painful and incapacitating left-sided ovulation every second month.

Mrs. G. H. since the age of twenty-one has had alternately good and bad periods. During the bad periods the pain is *always* on the left side, over the ovarian region, never on the right side, and for the first day it quite incapacitates her.

Miss E. G., twenty, has alternately good and bad periods. At the bad periods the pain is always over the left ovarian region, and is so bad as to make her limp and feel faint. She has "no pain at all during the good period" beyond the aching of the legs, which she has during all her periods.

Miss F. D., eighteen, has one good period as regards pain, but the next is a bad one, though the amount lost each period is the same. The pain is always over the left ovarian region, never on the right side. "Some of the good periods there is actually no pain at all," but at "the next period there would be great pain, and always on the left side."

Again, Miss H. C., age twenty-six. The periods used to be "nearly painless."

The last eighteen months she has had pains in the left hip and dragging pains in the left iliac region. For the last two years the menstrual periods have been alternately easy, and the next very painful.

"The easy periods are like those she used to have at first. In the painful ones the pain is always in the left groin; the easy and painful periods are quite alternate."

Here the pain recurring every other month over the left ovary points to the fact that the left ovary ovulates every other month with pain, while the right ovulation is painless.

Mrs. D. F. says: "Every other month I have a flooding. The period one month is fairly quiet, but the next one is a flooding," and so on alternately. She "cannot go out for first three days of her bad periods."

Alternately profuse and normal periods.

Miss L. S. says: "Every second month I am bad. One month I am up and as well as can be; next month I am awfully poorly and in bed the first day."

Alternate painful and painless ovulation.

Miss S. S. T. has alternately good and bad periods, though the pain is not definitely confined to one side.

Miss F. Y., twenty-two, has alternate profuse and scanty periods. Uses double the number of squares at her bad period to what she does at the next or slight one. She has no abdominal or ovarian pains.

In the following case a married patient has a left inguinal hernia, whose sac probably contains the left ovary; it is not a true hernia of the ovary.

Mrs. H. L. has had two boys and no girls!

She wears a truss for a left inguinal hernia, which is painful at alternate periods. When wearing it she has no pain in the lump "except when she is poorly." She then has to take off the truss "to ease the pain in the lump."

"I don't have the two months alike; one month the pain is worse than the next."

"The lump is tender to the touch when poorly."

"The pain makes me feel quite sick; it is worse one month than another."

The left ovary is probably in the hernial sac.

Note, too, that both her children came from the right, or normal ovary, and so were boys.

The alternate monthly pain over the left ovary points to the left ovary ovulating every other month with pain, the right ovulation being painless.

Mrs. F. P. menstruates every *second month only*, and then without pain. At the time when the next period should appear, but does not, she has great pain over the right ovarian region, never over the left. This pain occurs bimonthly. So one month there is painless menstruation; next month pains, always over the right ovarian region, but no menstruation appears.

She has had two children—both girls!

First, then, this case should be compared with the previous one, and the difference in the children noted. This case shows *bimonthly* normal ovulation from the left ovary, and painless menstruation, followed next month by distinct pains over the right ovary, but no external evidence by menstruation of ovulation taking place. We must infer normal ovulation from the left ovary, and abnormal from

the right ovary, and amenorrhœa. Practical proof is shown, by the two children being of the same sex (female), that the ova came from the left ovary; it is therefore a most convincing case.

In this case, a patient of Dr. T. G.'s had a severe attack of appendicitis, and later a large appendix abscess formed. Since then she has had more pain in the right ovarian region, with each alternate menstruation, than formerly, and she has since had two girls, but no boy !

Here, probably, owing to inflammatory adhesions, etc., round the appendix, and consequently in the near neighbourhood of her right ovary, the latter has become bound down, and hence ovulation therefrom has become painful; and quite possibly the ova are unable to properly escape, and so reach the Fallopian tube. So that both her children have been girls, as no ovum from the right ovary has been available.

I think I may rightly claim that these cases prove alternate monthly painless and painful ovulation evidenced by alternate monthly pain over one and always the same ovary.

It must be recalled that *Garrigues*[1] states that—

"In some patients I have observed that alternately *one or the other* ovary undergoes a considerable swelling at the time of every menstruation."

So that this corroborates the alternate ovulation of the ovaries.

Finally, the strongest proof of alternate ovulation by the ovaries lies in practically trying it, as was done in the following case, of which I have full details. It is most convincing and conclusive.

Mrs. T. A. G. writes thus in a letter to me: "Having purchased and read 'The Causation of Sex,' I was very much struck by your theory, and decided to put same to the test," so "we commenced to make notes of the menstrual periods." Then follows in the letter a list of menstrual periods, showing alternately painful and painless periods. To quote again: "You will see by above that we were able to tell which side ovulation had taken place, on account of more

[1] Garrigues, "Diseases of Women," 1900, p. 122.

or less pain every other month on the right side." "In April 1914 we decided to undertake parenthood; therefore you will see that we expected and wanted a son. April 14, 1914, was the last period, and I am pleased to say a son (a perfect bonny boy) was born to us on January 8, 1915."

This case would, I presume, be called a "chance success" by one of my sceptical reviewers.

Besides these cases of pain every alternate month over the same ovarian region, we must note the frequency of unilateral mammary pain in association with menstruation.

Pain in *one* breast only during menstruation (the outward sign of ovulation) evidently points to unilateral and alternate ovulation, for the very intimate association of the breasts and the genitalia is universally known. *Dr. E. J. Tilt*[1] writes of "the intimate sympathetic connection existing between the ovaries and the breasts." *Temesvary*,[2] who has carefully studied the subject, has noted that in some cases menstruation causes extremely severe mammary pain, "so that the women in question cannot lie on the corresponding side."

As the breasts are usually affected alternately, we get proof of alternate ovulation. In some cases one breast only is painful every alternate month, so we are justified in saying that if the right breast is painful, then the right ovary has ovulated.

The following is an actual example of this from my own practice:

Mrs. A. C., age twenty-six, has neither abdominal nor ovarian pains at her periods, nor in her left breast; but she has "very sharp pains, every other period, in the right breast, which last throughout the period." She cannot lie on her right side during these alternately painful periods owing to the pains in the right breast.

That only one breast should be painful every other month during the menstrual period, if it does not signify ovulation from the corresponding ovary, would be hard indeed to explain. It certainly supports the contention of alternate ovulation.

[1] E. J. Tilt, "Diseases of Women," 2nd edit.

[2] Temesvary, "Journal of Obstetrics and Gynæcology," vol. iii. 1903, p. 513.

I have, too, decisive evidence of some women definitely noticing "shooting" or "fine pricking sensations," like nerve thrills or telegraphic messages, in first one breast only, then next month in the other breast only, for from three to seven days prior to the appearance of each menstrual period. This points not only to ovulation preceding menstruation as to time, but also being usually quite painless as far as the ovary or ovarian region is concerned. Owing, however, to its "intimate connection" with the breast, a nerve message from the ovary of ovulation having occurred therefrom is conveyed to the corresponding breast some days before the flow appears.

As the patients have noticed this "tingling" message in one breast one month, and in the opposite breast the next month, we have here most conclusive support of alternate ovulation. It is to be noted that this "tingling or pricking sensation," indicative of ovulation, is quite different from the lasting mammary pain just previously described.

Leguen[1] reported a case proving the intimate association of the ovary with the breast of the corresponding side. He performed ovariotomy for a tumour in the right ovary.

"The right breast at once underwent atrophy."

Dr. T. G. Drennan[2] has noticed cases of alternate right and left mammary pain, and deduces alternate ovulation therefrom.

Whether in a pregnant woman the first breast to have any fluid or milk corresponds always to the ovary which has supplied the fertilised ovum—*i.e.* whether the left breast always secretes first when the child is female, and *vice versa* —is a very difficult question to prove.

It is necessary to observe only primiparous women, for milk very early and easily appears in the breasts of multiparæ. In primiparæ I find that milk is usually present before they inform their doctor they are pregnant even; but in five cases I have proved that the right breast had milk in it first, and the child born was a boy in each case. Strangely enough, I have met with only one case of the left breast having milk first, and the child being a girl.

[1] "Brit. Med. Journ.," Feb. 1904, p. 388.
[2] "American Journal of Obstetrics," Oct. 1902, p. 502.

In the case of Mrs. E. F., who was delivered by me of a boy, not only was her right breast much larger than her left, but the nipple and the areola were most marked, and were quite six times larger and much darker than the left nipple and areola. While Mrs. W. H., who was prematurely delivered of a stillborn female child in March 1911, still had milky fluid oozing from her left nipple on August 1, 1911, when I examined her. The right breast was quite dry, and she had never seen anything therefrom.

Mrs. L. S. G. engaged me to attend her on June 20, 1912. She was turned two months pregnant. Her right breast was so much larger and firmer than the left that I there and then predicted a boy for her. I delivered her of a boy on January 15, 1913.

I have been unable to obtain more cases owing chiefly to the reserve of the early pregnant woman, and her not coming under observation soon enough.

Confirmatory of this, *Sir J. Bland-Sutton*[1] and *Dr. Lewers*[2] have both recorded cases of milk in *one* breast *only* in cases of tubal pregnancy. In each case the breast corresponded in its side to the gravid tube, and therefore to the oösperm-supplying ovary. Dr. Lewers' case was on the right side; Sir J. Bland-Sutton does not specify which side.

I have seen several cases of abscess in the breast which corresponded to the sex of the child: thus, child born female, breast affected the left, and *vice versa*. *Billroth* states that abscess of the right breast is distinctly more frequent than abscess of the left breast, there being 250 cases of abscess in the right breast to 190 cases of left-breast abscess. But, then, boys are more often born than girls, and thus probably we get the reason for the greater number of right-breast cases. At all events, the breast most often affected corresponds with the ovary which, being larger, leads to most children (males) being born. Be it noted that bilateral mammary abscess is distinctly rare—about 8 per cent. of all cases only—and boy and girl twins are also rarer than single boys and girls.

[1] "Diseases of Ovaries," 1896, p. 296.
[2] "Trans. Obstet. Soc.," 1900, vol. xlii. p. 326.

These cases, then, all go to prove alternate action of the ovaries in ovulating, for we have had—

pain over the same ovary in alternate monthly menstrual periods;

pain in the same breast in alternate monthly menstrual periods;

and the intimate association of the breast and ovary of the same side are proved by

milk first appearing in the breast corresponding to the side of the pregnancy (normal or extra-uterine);

abscess in the breast corresponding to the sex of the pregnancy.

While *Emmett's* case of bimonthly menstruation from the normal half of a bicornute uterus is convincing.

If fertilisation invariably followed ovulation, we might expect the children would be more often born alternately male and female. That this does occur sometimes we have seen in Chap. XVII.

Owing, however, to the uncertainty of fertilisation in the human species, and to the fact of insemination occurring at any time, and so not happening to fertilise the ovum from the opposite ovary, such regular alternation in the sexes does not often happen.

It is otherwise, however, in the monotocous animals, who permit insemination (from which fertilisation practically always follows) *only* when an ovum is provided—*i.e.* when on heat—(see Chap. XIV., p. 99, for the remarks by *Farre*) which *Heape*[1] thus confirms:

"In many, possibly most of the lower mammals, though not in all of them, ovulation and heat are indissolubly connected."

In mares and cows especially we find that male and female offspring appear alternately, provided the female is allowed access to the male when instinct or "nature" prompts her—that is to say, if the female is covered when the mother first ovulates and shows sexual desire—*i.e.* the first rutting after the birth of her recently born foal or calf.

This fact is well known to many veterinary surgeons in the country. A friend of mine, a doctor, "by acting on

[1] Heape, "Trans. Obstet. Soc.," 1898, p. 171.

this has made his cow give him three heifers (or females) in succession by preventing the bull getting at her for a month after calving, thus missing the first rut or ovulation, which would give a male."

The following extract from a private letter from a farmer correspondent is very confirmatory:

"Our experience supports your theory so far as practice goes. For some years between 1888 and 1893 my father and I carried out your theory in breeding our pedigree Jersey herd. We concluded that the sex changed with every heat. On this theory, and desiring cow calves, we were very successful."

The fact is made use of also by stockbreeders—*e.g.* in South Africa, where, when "ordering cows from England to calve there, they stipulate for a bull calf to be born, relying on its being so if the last calf was a heifer."

Dr. L. M. Snow[1] recently thus confirmed this:

"Suppose a mare has a filly foal, and goes to the horse on the ninth day after foaling and becomes pregnant, the foal will be a colt, for at her last rutting time she became pregnant with the recently born filly. I may say he has correctly foretold me the sexes of his foals for the last five years."

Because a woman's children are not alternately male and female it is no proof that ovulation was not alternately from the right or male and left or female ovary; it signifies only that fertilisation did not happen to occur in an ovum from the opposite ovary to the one which yielded the former child.

When one ovary has been completely removed, ovulation from the remaining ovary soon ceases to be only every alternate month; a compensatory activity sets in, and both menstruation and ovulation then occur every month with great regularity, as usual. We all know how vision, hearing, and manual dexterity become keener and greater when the fellow eye, ear, or hand become useless or are removed. In the same manner the single ovary becomes equal to all demands upon it; for it grows and increases in size to make up for the deficiency, rising, as it were, to the occasion and fulfilling the function of the two, somewhat like the single kidney does after the removal of its fellow.

[1] "Brit. Med. Journ.," May 16, 1903.

CHAPTER XXIII

THE FORECASTING OR PREDICTION OF THE SEX OF THE COMING CHILD

FROM the contention of ovulation occurring alternately from the male or right ovary, and the female or left ovary, I have been able to correctly forecast the sex of the forthcoming child of my pregnant patients, as well as of some others whom I had not even seen.

I claim to have had 97 per cent. of successes; the 3 per cent. of failures are chiefly due to—inability of the mother to correctly state in which month her confinement is to be expected. Thus, if a patient states she is to be confined in June, for example, and I have predicted a female child, but she is delivered of a full-time male child in May or July, my prophecy is thrown wrong; but she would have been told to expect a male in either of those months had the mother said she expected in one or other of them. Some of these cases are due to menstruation occurring once at least after the patient has become pregnant, so that the expected month of birth is wrong. Similarly, should pregnancy occur during lactation, when menstruation is usually absent, it would be difficult to know exactly which ovulation had been fertilised.

Forecasts of a child's sex must be made for full-time children, for premature children may or may not make the prediction wrong, since if born two months too soon the sex would be correctly foretold because it would be the same as in the full-term month; if born a few days to a month too soon the forecast will be wrong.

Such immature children and all abortions and miscarriages

interfere with the rhythm in calculating later pregnancies. See the case of the Queen of Spain's family in Chapter XXVI., p. 216.

Failure in other cases is due to—an irregular type of ovulation; that is, instead of being of the normal 28-day type, so that four weeks elapse between each ovulation, the patient goes perhaps only 21 days or even 30 to 35 days.

Allowing 28 days or four weeks for the average menstrual periodicity (the external sign that ovulation has occurred), we get 13 ovulations during the 52 weeks of the year. Of course, if it recur every 21 days, we get an increased number of ovulations, if only every 30 days we can only allow 12 ovulation periods, with a thirteenth every sixth year.

All these peculiarities in different women have to be allowed for when forecasting the sex; but with the following rules and examples the medical attendant of any pregnant woman should be able with care to correctly foretell the sex of the child with which she is pregnant, and further to tell other women during which times to avoid getting pregnant if a certain sex child be desired.

This can roughly be done with the aid of the usual obstetric tables, for, given the sex and the birthday of the patient's last child, the ovulation month (and naturally the sex of that ovum) can be readily found from the tables. I have, however, found it more reliable to work it out by means of the forty weeks' plan here given.

It is necessary to obtain from the patient the following particulars before it is possible to forecast the sex of the coming child:

1. How often do your menstrual periods occur ?
2. How many days does each usually last ?
3. Are they always quite regular ?
4. What was the date when your last child was born ? (Year, month, and day must be known.)
5. Was the child a boy or girl ?
6. Was it born at or about the time expected, or before or after its expected date ? If either, by how many days or weeks ?

7. How long did you suckle the child, if at all?

8. When did the menstrual period reappear after the confinement?

9. Give the dates of all periods seen since the last child was born.

10. When is the next period expected?

11. Have there been any miscarriages since baby was born?

12. Give the dates of birth and sex of your other children.

A woman's normal period of gestation—that is, her pregnancy—lasts for 280 days, or ten months of four weeks each—that is, forty weeks of seven days, making 280 days in all. The expression "nine months of pregnancy" should be abandoned, because inaccurate.

Given therefore the child's birthday, we go backwards forty weeks to find the ovulation month, or month in which the ovum was fertilised which yielded the child. The sex of this child being known, we then proceed alternately from this ovulation month until we come down to the tenth ovulation period prior to the expected month of birth of the coming child, allowing an extra or thirteenth ovulation between each December and January of the year following if the actual period dates are not known.

We can therefore find the sex of the ovulation which has just been fertilised and with which the patient is now pregnant; so we are able to correctly foretell the sex of the coming child.

Because of the thirteen ovulations per annum, it follows that if the October ovulation of one year is fertilised the next October ovulation will be of the opposite sex, because of the odd or thirteenth month or ovulation period which has to come between the two Octobers; so that if a patient has a child in one month of one year and another child in the same month of the next year, the sex would be the opposite.

Examples of this are to be found in the family of her late Majesty Queen Victoria, thus: first child, Princess Victoria, the Princess Royal, born November 21, 1840; second child, King Edward VII., born November 9, 1841; also in the Duke of Edinburgh's family: first child a boy, born October

1874; second a girl, born October 1875; and again in the Duke of Connaught's family: first child a girl, born January 1882; second a boy, born January 1883.

The following few instances are from actual cases in my own practice (they do not exhaust my lists), thus:

Mrs. T. S. C. had a girl February 6, 1914, and a boy February 11, 1915.

Mrs. B. L. H. had a girl September 24, 1906, and a boy September 2, 1907.

Mrs. W. had a girl May 12, 1909, and a boy May 26, 1910.

Mrs. F. A. had a girl December 7, 1905, and a boy December 18, 1906.

Mrs. C. S. G. had a boy born July 2, 1899, and she had a girl born July 4, 1900.

Mrs. T. P. C. had a boy born August 10, 1901, and she had a girl born August 13, 1902.

Mrs. L. R. had a boy May 6, 1904, and a girl May 17, 1905.

Mrs. W. T. had a boy September 3, 1906, and a girl September 7, 1907.

Mrs. K. P. had a boy August 24, 1907, and a girl August 12, 1908.

Mrs. S. C. had a boy February 15, 1914, and a girl February 25, 1915.

If instead of the next year it be the *same* month of the next year but one, then the sexes will be the same, thus:

Mrs. S. P. had a boy September 1899, and she had a second boy September 1901, because September 1900 would have given a girl.

Mrs. N. L. had a boy February 21, 1897, and another boy February 10, 1899; for February 1898 would have given a girl.

Mrs. D. H. had a boy February 17, 1906, and another boy February 27, 1908; for February 1907 would have given a girl.

Mrs. B. had a boy December 20, 1901, and another boy December 7, 1903; for December 1902 would have given a girl.

Mrs. T. S. had a boy June 1901, and a second boy June 1903, because June 1902 would have given a girl.

Mrs. R. R. D. had a girl July 1895, and a second girl July 1897, because July 1896 would have given a boy.

Mrs. M. B. had a girl May 9, 1892, and another girl May 12, 1894; for May 1893 would have given a boy.

Mrs. B. L. had a girl June 24, 1900, and another girl June 5, 1902; for June 1901 would have given a boy. Later another girl, January 13, 1907, and still another girl January 5, 1909; for January 1908 would have given a boy.

Mrs. V. B. had a girl September 22, 1909, and another girl September 14, 1911; for September 1910 would have given a boy.

Mrs. B. R. S. had a girl December 13, 1907, and another girl December 24, 1909; for December 1908 would have given a boy.

If instead of being the *same* month two years running the child is born the next month of the following year, the sex will be the same, thus:

Mrs. C. R. R. had a girl May 5, 1901, and another girl June 5, 1902, because May 1902 would have been a boy, so the next month (June) gave the girl it was.

Mrs. F. B. had a girl April 22, 1906, and another girl May 27, 1907; for April 1907 would have given a boy, so the next month (May) gave the girl.

Mrs. L. G. had her family thus:

Girl, Ethel, January 20, 1888.]
Girl, Florence, February 12, 1889.] R
Girl, Jessie, March 19, 1890.] R
Girl, Lily, July 6, 1892.

Note that the girls Florence and Jessie are each born thirteen months after their predecessors, and so are the same sex.

Mrs. R. L. had a girl May 9, 1897, and another girl June 11, 1898; for May 1898 would have given a boy, so June gave the girl.

Mrs. T. R. S. had a boy February 3, 1906, and another boy March 3, 1907; for February 1907 would have given a girl, so March gave the boy.

Mrs. B. T. had a boy September 9, 1898, and another boy October 20, 1899. Here, as September 1899 would have given a girl, October gave the male.

Mrs. S. A. B. had a boy November 4, 1908, and another boy December 21, 1909; for November 1909 would have given a girl, so the next month gave the boy.

Mrs. C. M. had a boy July 13, 1901, and another boy August 22, 1902, because July 1902 would have given a girl, so the next month (August) gave the boy.

Her third child, born August 17, 1905, was a girl, because we have just seen August 1902 was a boy, so August 1903 would have been a girl, August 1904 would have been a boy, and thus August 1905 was the girl—*i.e.* three years after the last boy.

Hence, if children are born in the *same* month an odd number of years apart they are of opposite sex; if an even number of years intervene they are of the same sex, thus:

Mrs. K. C. P. had twin boys on March 25, 1888, and four years later to the actual day, viz. March 25, 1892, she was again delivered of twin boys; so that because the births occurred in the same month an even number of years afterwards, she had the same sex children again. That she would have twins could not of course be foretold. (See also the examples in the case of the Empress of Russia's three last daughters, detailed in Chapter XXVI., p. 215.)

In the following cases the children were born in the same month a varying number of years apart.

Mrs. W. A. had her children thus:

Alfred, May 6, 1895.
Arthur, August 24, 1896.
Louisa, April 18, 1898.
Alice, November 10, 1899.
R [Ernest, March 22, 1902.] R
[Edward, March 10, 1904.]
Percy, April 19, 1905.

This case illustrates two points, the odd and the even number of years of interval, between similar months, giving the different and the same sex respectively.

Mrs. T. H. had a girl January 8, 1907, and a boy January 13, 1910.

Mrs. H. C. L. had a girl June 3, 1901, and a boy June 18, 1904.

Mrs. H. K. had a girl January 10, 1899, and a boy on January 17, 1906.

Mrs. T. H. W. had a boy August 15, 1904, and a girl August 12, 1907.

Mrs. D. B. had a boy November 12, 1906, and a girl November 8, 1909.

Mrs. N. F. had a boy November 17, 1903, and a girl November 19, 1910.

Mrs. M. S. had a boy December 9, 1907, and a girl December 19, 1912.

Mrs. S. C. had a boy February 15, 1914, and a girl on February 25, 1915.

Mrs. P. K. had a girl June 19, 1903, and another girl June 3, 1909.

Mrs. G. had a girl February 17, 1897, and another girl February 8, 1901.

Mrs. H. B. had a girl January 12, 1891, and another girl January 5, 1899.

Mrs. K. had a boy April 27, 1903, and another boy April 4, 1907.

Mrs. H. L. had a boy September 2, 1897, and another boy September 7, 1905.

Mrs. R. S. A. had a boy January 26, 1892, and another boy January 21, 1898.

Mrs. J. H. had a boy February 17, 1906, and another boy February 27, 1908.

We therefore get the general rule to proceed alternately from the known date and month of a child's birth down to the month the coming child is expected to be born in. We can then foretell its sex, though this method is not so invariably correct as is calculating from the ovulation periods. Thus:

Mrs. K. M. had a girl May 1896, and a boy July 1897, for May 1897 would have been a boy, June 1897 would have been a girl, and so July 1897 was a boy.

Mrs. S. C. D. had a girl April 1902, and a boy October

1903; for April 1903 would have been a boy, May 1903 would have been a girl, June a boy, July a girl, August a boy, September a girl; and so October was a boy.

Mrs. C. had a girl July 1900 and a boy November 19, 1905; for July 1901 would have been a boy, July 1902 a girl, July 1903 a boy, July 1904 a girl, July 1905 a boy; so August 1905 would be a girl, September 1905 a boy, October 1905 a girl, and thus November 1905 was a boy.

Mrs. S. W. had a girl October 1896, and another girl May 1901; for October 1897 would have been a boy, October 1898 a girl, October 1899 a boy, October 1900 a girl, October 1901 a boy; therefore if October 1901 would have been a boy, September 1901 would have been a girl, August a boy, July a girl, June a boy, and May 1901 a girl, which it was.

Mrs. B. R. A. had a girl April 1886, and another girl August 1888; for April 1887 would give a boy, April 1888 a girl. Therefore May would give a boy, June a girl, July a boy, and August the girl it was.

Mrs. R. had a girl June 1888, and another girl November 1893; for June 1889 would give a boy, June 1890 a girl, June 1891 a boy, June 1892 a girl, and June 1893 a boy; so July 1893 would be a girl, August a boy, September a girl, October a boy, and November 1893 a girl, which it was.

Mrs. M. B. had a boy April 1901, and a girl September 1903; for April 1902 would give a girl, April 1903 a boy, May a girl, June a boy, July a girl, August a boy, September a girl, which it was.

Mrs. G. P. H. had a boy February 1900, and a girl May 1902; for February 1901 would have been a girl, February 1902 a boy; so March would have been a girl, April would have been a boy, and May was a girl.

Mrs. F. G. had a boy July 1898, a girl June 1902; for July 1899 would have been a girl, July 1900 a boy, July 1901 a girl, July 1902 a boy; therefore June 1902 gave a girl, which it was.

Mrs. L. M. had a boy April 1899, and another boy February 1903; for April 1900 would have been a girl, April 1901 a

boy, April 1902 a girl, April 1903 a boy. If therefore the child was expected in February 1903, we know March 1903 would have been a girl, and February 1903 would give the boy, which it was.

Mrs. W. L. had a boy August 1896, and another boy November 1901; for August 1897 would give a girl, August 1898 a boy, August 1899 a girl, August 1900 a boy, and August 1901, a girl; so September 1901 would be a boy, October 1901 a girl, and November 1901 a boy, which it was.

Mrs. G. W. G. had a boy May 1901, and another boy August 1904; for May 1902 would have been a girl, May 1903 a boy, May 1904 a girl, June 1904 a boy, July 1904 a girl, and August a boy, which it was.

I have here given three examples of each kind of succession—viz. girl followed by boy, girl by girl, boy followed by girl, and lastly boy by boy—to show that the order of birth makes no difference to the plan.

In the following cases only eleven months elapsed between the births, so the sexes will be the same, thus:

Mrs. R. B. had a boy April 13, 1908, and another boy March 26, 1909; for April 1909 would have given a girl, and so the preceding March gave a boy.

Mrs. S. R. had a boy February 9, 1914, and another boy January 12, 1915; for February 1915 would have given a girl, so the prior month gave a boy.

Mrs. I. had a boy April 9, 1909, and another boy March 18, 1910; for April 1910 would have given a girl.

Mrs. L. H. had a boy March 10, 1899, and another boy February 27, 1900; for March 1900 would have given a girl.

Mrs. R. H. had a girl February 20, 1914, and another girl January 17, 1915; for February 1915 would have given a boy, so January gave the girl.

Mrs. L. G. had a girl August 6, 1892, and another girl July 8, 1893; for August 1893 would have given a boy, so July gave the girl.

In the following cases the children were born on actually the same date of the same month, a varying number of years apart.

Mrs. G. P. had a girl September 15, 1896, and a second girl September 15, 1904.

Mrs. B. E. had a girl May 13, 1900, and a second girl May 13, 1906.

Mrs. T. C. had a boy July 5, 1901, and a second boy July 5, 1903.

Mrs. F. had a boy October 8, 1895, and a girl October 8, 1898.

Mrs. G. F. T. had a girl December 6, 1897, and a boy December 6, 1898.

In these cases the patients had their children very closely together—thus:

Mrs. T. H. F. had a girl January 6, 1908, and a boy December 31, 1908.

Even if we count December 31 as a January 1909 birth, they come right to each other.

Mrs. H. H. B. had her children thus: A girl November 18, 1908, and a boy October 8, 1909 (prematurely). He was definitely, to my knowledge, expected the first week of November.

Mrs. T. W. had a girl October 16, 1911, and a boy August 20, 1912.

The following interesting cases, correctly foretold, show that the birth of a premature, not fully developed child must be taken as having occurred in the month in which it was expected, and not in the month wherein birth actually took place; thus:

Mrs. L. C. G., who expected on January 24, 1902, was delivered on January 21 of a boy. On November 10 she engaged me to attend her with her next, which she expected the middle of February 1903. I foretold a boy. She was delivered prematurely on January 21, 1903, of another boy, so both children had the same birthday a year apart! It was a boy, because due in February; thus: January 1902 gave a boy, January 1903 should give a girl, and February a boy, which the child was, though born prematurely and not fully developed in January.

Mrs. B. T., who expected about the middle of March,

was confined on March 23, 1904, of a girl; she expected again May 25, 1906. I foretold a girl again. She was prematurely confined on March 19, 1906, of twin girls. As March 1904 was a girl, March 1905 would be a boy, and March 1906 a girl; so, too, April being a boy, May would give the girl as foretold. Of course the twins were not predicted. So, though born two months prematurely, and properly being due in May, this forecast was actually correct, as it would have been had the twins arrived in May.

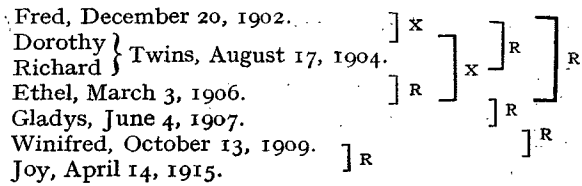
TWINS AND SEX PREDICTION.—The following cases of twins show, that though twinning itself could not be foretold, yet in the case of boy and girl twins the sex of the child which *should* properly have been born, had it been a single birth, could and would have been correctly predicted.

Where the twin children are of the same sex, the prediction is no more difficult than an ordinary single birth.

The following interesting cases contain in each family a case of boy and girl or "pigeon-pair" twins. These instances not only support my contentions, but also show very clearly which ovary, anticipating its usual rhythm, actually ovulated "out of its turn," and, owing to ovulating synchronously with its fellow-ovary, led to two ova being simultaneously provided, with the result that, both being fertilised, boy and girl twins were born.

The cases form a convincing answer to the reviewer who considered boy and girl twins were not explainable by my theory.

Mrs. L. B. T. had her family thus:

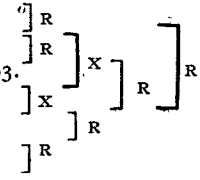


From this list, it will be seen that the birth of Richard comes right or correct from Fred, and also with Ethel; whereas Dorothy comes wrong from Fred, and wrong with

Ethel, who followed. It is plain, therefore, that Dorothy was the interloper, and that the *right* ovary, which provided Richard, was acting normally to time, and that the *left* ovary, which provided Dorothy, acted "out of its turn," so that, the two ova being provided simultaneously, twins resulted. The other children follow each other quite correctly, as did Ethel from Fred.

Mrs. W. F. had her family thus:

Dorothy, January 21, 1889.
Blanche, January 22, 1891.
Edward, Edith } Twins, October 15, 1893.
Herbert, December 4, 1895.
Alfred, October 15, 1897.
Ethel, July 22, 1901.

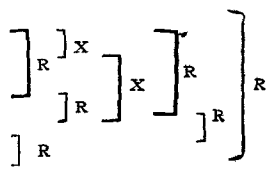


In this case also it is the *left* ovary which has acted "out of its turn" and supplied an ovum at the same time as the right, so that pigeon-pair twins resulted.

It will be seen that Edward comes right from Blanche and to Herbert—whereas Edith comes wrong from Blanche and to Herbert, Herbert comes correctly from Blanche, as Alfred and Ethel also do from Herbert. The case shows that Edward was the correct child to be born and not Edith.

Mrs. F. S. had her large family thus:

John, February 3, 1875.
Richard, December 25, 1877.
Thomas, October 9, 1879.
James, June 5, 1881.
Jane, July 31, 1882.
Edward, November 12, 1884.
Elizabeth, December 2, 1886.
Charlotte, January 2, 1889.
Ellen, March 3, 1891.
George, Annie } Twins, March 20, 1893.
Robert, February 8, 1895.
Louisa, January 2, 1897.
Charles, March 22, 1900.



In this case it is the *right* ovary which has acted "out of turn," and, supplying a male ovum at the same time as the *left* did a female, boy and girl twins resulted.

The children all came correctly with each other except the twin George, who comes wrong with Ellen and with Robert; his companion twin Annie comes correctly from Ellen and to Robert, as these two do to each other.

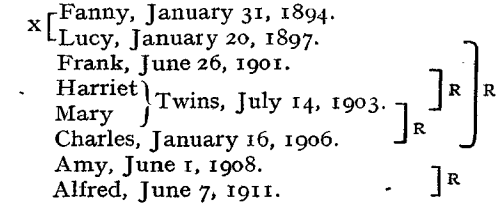
Note how Charlotte and Louisa, born on the same date of same month, but years apart (January 2, 1889, to 1897) come correctly to each other.

Jane, born July 31, however, is wrong; but if this be counted as August—as the menstrual month has not thirty-one days!—*all* the children come right with each other.

It is a case where the last day of the month should properly rank as a day of the month following; it is not possible to have thirteen ovulation periods analogous to lunar months if they contain more than twenty-eight days. This case of 14 children in 13 confinements all coming correctly bears out the criticism of a reviewer, that there was "remarkable concordance with expectation."

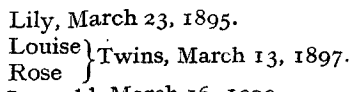
In the following cases of twins, being of the *same sex*, they naturally are both correct, if one is, with the other members of the family. The cases imply two ova from the same ovary, in these cases from the *left* ovary, evidently.

Mrs. B. G. had her family thus:



Note that all the births come correctly, and that January and June account for six of the dates. Fanny comes wrong, but January 31 should count as February 1894.

Mrs. P. B. had her family thus:



Here all dates are correct, and all are in the month of March.

Mrs. L. R. had her children thus:

1. Emily } Twins, December 19, 1897.
2. Ellen }
3. Alice, January 9, 1900.
4. Bertha, April 13, 1901.

The double ovulation by the one ovary (the left) has not affected the dates of the subsequent children.

In these cases the *right* ovary has evidently supplied the two ova at one time, hence twin boys resulted.

Mrs. T. H. B. had her family thus:

1. William, January 18, 1861.
2. Alice, January 2, 1862.
3. James, October 12, 1864.
4. Walter, June 9, 1866.
5. George, April 19, 1868.
6. Arthur } Twins, April 21, 1870. = R, R
7. Albert }
8. Charles, June 23, 1872.

All the birth dates come correctly, and the sex of the sixth confinement, but not the twinning, could have been rightly foretold, as the eighth child also would have been.

Mrs. F. C. E. had her children thus:

1. Boy, September 30, 1908.
2. Boy } Twins, May 19, 1911. = X, R
3. Boy }
4. Boy, January 18, 1913.

This is an interesting case where September 30 must rank as October; the birth date of the twin boys would then be right, and could have been correctly foretold, as would the fourth child from the date of the twins.

In the following cases an error in the month in which the child was expected to be born led to my forecast being wrong. Had the month been correctly told me by the mother the prophecy would have been correct; thus:

Mrs. W. H. had a girl born August 24, 1898. She expected to be confined, she said, the third week of July 1903.

I therefore foretold n April 15, 1903, that she would have a girl in July 1903; instead she was delivered of a fully developed boy at 1 a.m. on June 28. Had she told me to expect in June, I should have of course correctly foretold her a boy; thus: August 1898 gave a girl; August 1899 would be a boy, August 1900 a girl, August 1901 a boy, August 1902 a girl, August 1903 a boy, hence July would give the girl I foretold, while June 1903 would give the boy, which was born.

Mrs. M. G. had a boy born May 19, 1902. She expected, she said, to be confined in the middle of August 1903. I therefore predicted she would have another boy. She was delivered on July 27 of a fully grown girl. I should have predicted a girl for July had that month been given to me; thus: May 1902 was a boy; May 1903 would be a girl, therefore June would give a boy, and July 1903 a girl, which it was, the first four children having all been boys.

Therefore, from the experience of these and other cases, I soon learned to prophesy like this: You will have a boy if the child is born in August, and a girl if it be born fully developed in July.

Thus Mrs. R. S. said she expected to be confined at the end of August 1902; I, however, calculated the probable date of her confinement as July 20, 1902; I therefore predicted, when she engaged my services on May 9, 1902, that she would have a boy if the child was born in August, but a girl if born in July. She was delivered of a girl at 3.30 a.m., July 11, 1902.

Mrs. T. R. expected in July; I calculated her date as August, so prophesied she would have a boy in July, or girl if born in August 1902. It was a boy, born 7 a.m., July 23, 1902.

Mrs. B. expected, she said, in October 1903; I calculated her date as September 26, 1903, and told her on July 24, 1903, when she engaged me to attend her, that she would have a girl if born in September, a boy if born in October. She was delivered of a girl, midday, September 26, 1903.

These, then, are some only of the cases from my own practice, in which I have correctly foretold the sex; in some several hours before the birth, in others weeks and

months even, ranging from two to six months, prior to birth. And for several of them I have written certificates, signed not only by the laity, that I did correctly forecast the sex of their children.

Probably, after testing my plan for forecasting the sex of a child, by the data of members of his own family, the reader will be sufficiently interested to test it by the Royal and aristocratic families, the dates of whose children's births he can readily find recorded in books.

He will find that in nearly all cases the sex of a subsequent child could have been correctly foretold, owing to the previous child's sex and birthday being known.

In some few cases errors may appear, owing chiefly to premature births, stillbirths, miscarriages, etc., of which naturally he will find no record; and it is suggestive that in some of the errors he will find an unusually long interval has occurred between the two births, the inference being that a miscarriage or stillbirth had taken place in between.

Hence a doctor in actual attendance on patients whom he knows, will obtain a larger percentage of correct results, than would be obtained by looking up the recorded dates of births, in families of whose intimate medical history he is ignorant; for he would not know the mother's menstrual rhythm, nor whether a child was born to its expected time or no.

CHAPTER XXIV

DIFFICULTIES AND SOURCES OF ERROR EXPLAINED

THE chief causes of error in predicting, as also in determining the sex of the next child are three in number:

First.—Prematurity or post-maturity of birth of a precedent child.

Secondly.—Irregularity of menstruation (ovulation) as well as *unusual* menstrual rhythm. Instead of the 28-day type it may be—

25 days' interval; there would be 14 periods for one year, 15 during the second year, and 14 during the third year, and so on.

27 days' interval; there would be 13 periods for one year, and for the next year 14 periods.

This mountain in the eyes of one reviewer, I have practically found to be indeed but a molehill.

30 days' interval; there would be 12 periods per annum for five years, with a thirteenth in the sixth year; and 12 again in the seventh and following years.

Any of the above, if calculated as of the 28-day type, and *always* giving 13 periods per annum, will lead to errors.

Thirdly.—Ovulation periods which occur between the 22nd and 29th of most calendar months, inasmuch as they may give rise to a birth in *one or other of two* differently named calendar months, are a fruitful source of error; as are those births which occur between the 1st and 7th of a month. Because the ovulation which gives rise to them, is in a calendar month of different name to that for the ovulations for the greater part of that particular calendar month.

Under the heading of prematurity of birth come those cases where children are born on the last few days of a month, instead of, as expected, in the first few days of the

month following. A few days make all the difference between a right and a wrong forecast—*e.g.* birth on May 30 instead of June 2. A comparatively trifling domestic incident—*e.g.* a stumble or fall, a dose of medicine, a quarrel or fright, a long motor drive, and many others besides—may be the inciting cause of the earlier onset of labour. Every practical obstetrician meets with such cases and incidents, though they are not mentioned, and do not appear alongside the list of the dates of birth of the children in the family Bible. In many cases, too, the medical attendant, by the use of his midwifery instruments, so expedites the labour that he makes what would have been an August 1 birth into an arrival on July 31.

The following cases of families' birth dates appear to show errors when worked out by my rule, but they are not really so.

Mrs. L. D. S. had her children thus:

		Theoretical Ovulation Period.	
X	Boy, December 31, 1899	March 26, 1899.	R
	Girl, June 30, 1903	September 23, 1902.	

The above case shows how births on the last day or two of a calendar month should usually count as a birth in the month following. My method of forecasting and determining sex allows only 28 days to an ovulation period, and so we get 13 such in the year. It is therefore unreasonable, in some cases at least, to expect births late in a month, or the first day or two of a month, to work out correctly. Certain June ovulation periods, *e.g.*, will give a birth in the last day or two of March or the first few days of April; so that one ovulation may actually cause a birth in either of two calendar months. Hence we get errors from this cause.

The case shows that an ovulation or menstrual "month" or period differs from a calendar month, just as the lunar months do.

In the above example, if December 31, 1899, be reckoned as January 1900, and June 30, 1903, be reckoned as July, the births come correctly to each other. The ovulation dates, it will be seen, come correctly to each other.

Mrs. C. O. had her family thus:

Boy, August 17, 1895.
Girl, July 30, 1898.] X] R
If reckoned as August 1898.]
Boy, February 1, 1901.] R
Boy, May 31, 1907.] X] R
If reckoned as June 1907.]

This striking example shows the dates of birth all wrong, but made correct if, the dates of the calendar months not being allowed to exceed the 28 days of an ovulation period, the births are reckoned as occurring in the month following.

Mrs. J. E. had her children thus:

Boy, Joseph, May 18, 1881.] X
Girl, Elizabeth, January 29, 1883.] X] R
Boy, Edward, June 2, 1884.] R
Boy, Charles, November 10, 1885.] R
Girl, Susan, March 25, 1890.]

If January 29, Elizabeth, be counted as a February birth, *all* the dates are correct.

Mrs. C. E. F. had her family thus:

Boy, September 30, 1898.] X
Boy, May 19, 1901.] R
Boy, January 18, 1903.]

If September 30 counts as an October birth, all the dates are correct.

Mrs. B. had—

A boy, January 6, 1903.
Another boy, May 30, 1906.] X

If May be counted as June, the dates come right.

Mrs. T. H. F. had—

A girl, May 31, 1898.
Another girl, February 16, 1900.

So if May 31 is counted as June, these dates come right.

Mrs. L. H. C. had her family thus:

Girl, May 30, 1901.
Expected in June by the patient and myself, her doctor.
Boy, March 18, 1903.
Expected by me March 17.
Boy, June 18, 1904.
Expected by me second week of June.
Girl, December 13, 1905.

If the first girl's date, May 30, is reckoned as a June birth, all the dates come correctly.

Mrs. C. K. P. had her children thus:

Girl, August 5, 1910.
Girl, November 5, 1911.
Boy, October 31, 1912.

If October 31 is counted as November, all dates are right.

Mrs. L. P. G. had—

A girl, July 31, 1910.
Another girl, November 6, 1911.

If July 31 ranks as August, the month she was expected in, the dates are correct.

Mrs. L. W.'s children were—

1. Girl, December 29, 1896.	R	If January 1897 R
2. Boy, June 12, 1901.		
3. Girl, September 30, 1902.	X	If October 1902 R
4. Boy, December 1, 1906.	R	If November 1906 R

Here three out of four dates are awkward. In 1 and 3 they should count as belonging to the following month, while December 1 should count as November—*i.e.* hypothetical post-maturity.

Mrs. J. L. had—

A girl, September 16, 1897.
A boy, September 30, 1901.

If September 30, 1901, is reckoned as October, this case comes right.

In these cases, as *both* births occur at the end of the months, they come right to each other as they stand; as do heir ovulation period dates, and as they would also do if each birth is advanced to the month following.

Mrs. T. R. had—

	Ovulation Dates.	
Boy, Cecil, March 30, 1906.	June 23, 1905.	R
Another boy, Leonard, April 30, 1907.	July 24, 1906.	R

Similarly, Mrs. K. C. had—

A girl, June 29, 1893.
Another girl, June 30, 1899.

Both come right with each other, as they would were each date counted as a day in July.

Case reported by Mr. C. C. Hurst, sent him by Mr. G. P. Mudge:

1. Girl, May 31, 1880.] X
2. Girl, November 20, 1881.] R
3. Girl, March 27, 1883.] R
4. Girl, June 4, 1884.] R
5. Girl, November 29, 1885.] R
6. Boy, December 28, 1889.] R

This case was quoted in a scientific journal as rather disproving the accuracy of my theory! But if May 31 is counted as June all the dates come correct. One only of the predictions comes wrong, *as the dates stand*, out of the six!

In writing of the above case, it was said: "A theory must not be judged too severely upon the basis of a few exceptions. Ovulation may have been suspended or irregular, or other disturbing causes may temporarily have disturbed the normal sequence." The writer did not, however, realise that usually there cannot be allowed more than 28 days in a calendar month, if the calculations are based on a 28-day ovulation interval. Why Mr. Hurst maintained that No. 3 came wrong from No. 2 child, I know not.

The following two cases were sent me by Professor L. Doncaster. Both show irregularity of ovulation from some evidently temporary cause; and though many of the dates come wrong, both cases illustrate certain of my contentions.

CASE A.

1. Boy, December 31, 1877. If January 1878] R
2. Boy, August 4, 1879.]
3. Girl, June 18, 1881.]
4. Girl, March 7, 1883.] R
5. Boy, January 2, 1885.]
6. Girl, August 6, 1886.]

Boy No. 1, born on December 31, should rank as a January 1878 child; he then comes right to No. 2.

No. 2 and No. 6 come right, but all the others are wrong. The patient cannot have been regularly of the 28-day type of menstruation and ovulation.

CASE B.

1. Girl, April 6, 1886.
2. Girl, March 24, 1887.] R
3. Boy, October 31, 1888.] X
4. Girl, July 30, 1890.] R
5. Girl, March 6, 1892.] R
6. Boy, September 13, 1893.] R
7. Boy, October 1, 1894.] R
8. Girl, March 1, 1899.
9. Boy, September 21, 1903.

Known to be premature (? 7-month child). .] R
Also if reckoned as November] R
And if reckoned as August

This case illustrates different points already alluded to, 3 and 4 being correct to each other, also when counted as births in the succeeding months, in which case 3 would also come right with 2; though 5 comes wrong to 4 if this is reckoned as August. But at least six dates then come right.

The following is a similar case from my own lists:

Mrs. B. M. L. had her family thus:

1. Girl, May 9, 1852.] R
2. Girl, May 12, 1854.] R
3. Boy, June 5, 1856.] R
4. Girl, October 29, 1858.
5. Boy, March 1, 1861.
6. Boy, October 29, 1862.
7. Boy, June 17, 1864.
8. Boy, May 8, 1866.
9. Boy, September 29, 1869.

Here 2 and 3 come right to the first born. Then 4, 6, and 9, are awkward dates at the months' end. If 4 is counted as November, she comes right with 3 and 5; but if 6 is counted as November the dates come wrong!

If 9 is counted as October, he comes right to 8, not otherwise. Note that 3 and 7 come right to each other. The case illustrates that the last day or two of a month and the first few days (No. 5, March 1) give the most mistakes.

Cases of Apparent Errors, due to Known Prematurity of Birth.

Mrs. L. B. H. had her family thus:

	Ovulation Dates.	
1. Boy, March 20, 1863.	June 13, 1862.	X
2. Boy, November 25, 1864.	February 18, 1864.	R
This boy was premature and stillborn.		R
3. Girl, February 27, 1866.	May 23, 1865.	R
4. Girl, June 8, 1870.	September 1, 1869.	R
5. Girl, September 25, 1871.	December 19, 1870.	R

It will be seen here that the second boy was premature and stillborn, being expected in December, the first five days of which would still be a February ovulation. This makes his date come wrong from his predecessor. After the actual birth of the second child, the dates of the girls follow correctly.

Mrs. McC. had her family thus:

1. Girl, July 17, 1907.		R
2. Boy, November 28, 1908.		R
3. Boy, January 6, 1910.		X
4. Girl, February 6, 1911.		R
This girl was not expected till mid-March.		R
5. Boy, February 11, 1912.		

In this case the premature birth of the girl renders her birth date wrong from her predecessor, the boy, No. 3; had she arrived in March, her date would have been correct. In reckoning for the next child, the *actual* date of birth of No. 4 must be taken, and not the *expected* date; and this helps to prove that ovulation starts again soon after the actual birth date, and not after the expected date. Note how No. 5 comes right from the actual birth date of No. 4, not from her expected date.

I attended Mrs. L. S. H. with her family, thus:

1. Boy, October 31, 1898.	
Expected mid-October.	R
2. Boy, October 1, 1900.	
Expected October 8.	R
3. Boy, April 6, 1904.	
Expected April 7.	X
4. Boy, July 15, 1906.	
Expected beginning of August. Died on second day; premature and jaundiced.	

Had this fourth child come when due, all the dates would be correct. His known prematurity makes his date wrong.

Mrs. T V. had—

A girl, April 4, 1915.
Expected April 9, 1915.
A boy, September 22, 1916.

The boy was expected by his mother and myself in mid-October. As his birth date stands, he comes wrong from his sister, but the absence on war service of the husband makes the expected time of birth practically certain. Had the child been born in October, the dates would be correct.

Mrs. J. C. T. had her family thus:

1. Boy, December 29, 1887.
   He was two weeks overdue.] R
2. Girl, December 9, 1888.
   Was a week premature.] R
3. Boy, May 1, 1890.
   About the expected time.] X
4. Girl, May 19, 1892.
   Was at least two weeks premature; due first week in June.] X
5. Girl, July 17, 1901.
   Considered two to three weeks premature; expected in August.] R

(R spans 3 and 4; R spans 4 and 5)

No. 4. being prematurely born in May instead of June, comes wrong from No. 3. Had she been born in June as expected, she would have been right.

No. 5, also premature, comes wrong from the actual birth date of No. 4. Had she arrived when expected, the dates would have been correct. The case shows two errors due entirely to prematurity.

Mrs. G. H. B. had her family thus:

	Ovulation Dates.	
1. Boy, June 18, 1910. Born two days before expected.] X	September 11, 1909.] X	
2. Boy, August 25, 1911. Born three to four weeks prematurely; expected in September.] R	November 18, 1910.] R	R
3. Boy, May 17, 1914.] R	December 1910. August 10, 1913.] X	

This case shows boy No. 2 prematurely born, and so coming wrong to No. 1. Had he been born when expected, in September, the birth dates would be right, as also would be his *actual* ovulation date, in December 1910, to September 1909. Note that the ovulation date of his actual birthday is wrong from the ovulation date, September 1909, of No. 1.

No. 3 comes correctly from the *actual* birthday of No. 2, August 1911, and so does his ovulation date, August 1913, from the *presumed* ovulation date for the *actual* birthday of No. 2; because ovulation starts after the *actual* birthday, not after the *expected* birth date. The case also shows that, to predict or to determine the sex of the next child, the *actual* date of birth must be used, and not the *expected* date.

A Case of Artificial Prematurity, Labour being induced.

Mrs. F. O. had her children thus:

1. Boy, born January 17, 1906. This child, a full-time one, was born when expected, but owing to a pelvic contraction the doctor said induction of premature labour would have to be performed in any subsequent pregnancy.

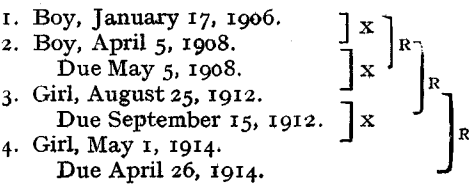
2. Boy, born April 5, 1908, labour having been induced a month prematurely, the child's birth being expected normally on or about May 5, 1908. As the boy No. 1 was born January 1906, January 1908 would have given a male, February a female, March a male, April a female, and May 1908 a male, which the child No. 2 was, though his birth had been expedited, so that he arrived in April.

3. Girl. Her birth was expected about September 15, 1912. Labour was induced on August 25, 1912, and the girl was born.

Now, by my theory we must reckon from the actual birth date of No. 2 child—viz. April 1908 (not from the expected month, May). As April 1908 gave a boy, April 1910 and 1912 would have given males, so May 1912 would give a female, June a male, July a female, August a male, and September 1912 a female, which the child was, though her birth was brought about prematurely in August.

4. Girl. Expected on April 26, 1914; delivery was delayed, and she was eventually delivered by Cæsarean section on May 1, 1914. As above, we reckon from the actual birth date of No. 3—viz. August 1912—which was a girl; so August 1913 would have given a male, August 1914 a female, and June and April 1914 would have given the female, which the child was, though actually artificially delivered on May 1, 1914.

Tabulated the births occurred thus—



The case is instructive as showing we must calculate from the actual date of birth if we wish to forecast or to determine the sex of a subsequent child, and not from the expected date of birth.

It shows that ovulation evidently begins again a " month " or period after the actual birth, whether premature or not, and whether naturally or artificially induced. The case is very convincing of alternate ovulation of male and female ova, and thus very strongly supports my theory. Note that all the *actual* birth dates come wrong to each other, but that the actual birth dates all come right to the expected birth dates of the succeeding children.

That women do not all conform to the 28-day type of menstruation and ovulation is a fact known to all, and I have had, since the first edition of this book was written, most extraordinary cases of ovulation irregularity sent to me, and these, besides constituting the most difficult cases to correctly determine the sex for, account for many contradictory cases.

In the following case the type is certainly not a 28-day type, for all the birth dates come incorrectly with each other, save 1 and 3 to each other.

Mrs. M. L. L. had her family thus:

1. Boy, September 12, 1885.
2. Girl, July 16, 1887.] R
3. Girl, September 15, 1890.]
4. Girl, August 25, 1892.
5. Boy, June 21, 1896.

It is not necessary to detail others.

Finally I give two convincing cases.
Mrs. W. P. S. had her family thus:

1. Boy, December 8, 1900.
   Two months premature; expected in February 1901.] R] X
2. Girl, December 16, 1904.] R
3. Girl, December 17, 1908.] R
4. Girl, December 9, 1910.] R

A strikingly confirmatory case. The last three children were born exactly when expected. Note that each of the four was born in a December.

Mrs. W. L.'s family came thus:

1. Girl, August 3, 1885.
2. Girl, September 10, 1886.
3. Girl, September 16, 1888.
4. Girl, January 17, 1890.
5. Boy, June 15, 1894.
6. Boy, September 20, 1897.
7. Girl, September 29, 1898.
8. Girl, September 3, 1900.

Note how five of the births occurred in the month of September!

The above is a good example of a fairly large family with "remarkable concordance with expectation," and thoroughly corroborates the theory. Well might one of my reviewers write: "The theory works out with curious exactitude in the cases tested" by him. Children 1 and 2 support the statement that 13-months apart children are of the same sex; Nos. 2 and 3, 7 and 8, show that births in the same month an even number of years apart are of the same sex; while Nos. 6 and 7 prove that the same month next year gives a change in sex.

CHAPTER XXV

A CONSIDERATION OF THE PRE- AND POST-MENSTRUAL THEORY OF SEX DETERMINATION

AMONG the fairly widely credited means of securing a boy or girl as wished is the belief that fertilisation must take place just *before* or just *after* a menstrual period, to secure the sex desired—the so-called " pre- and post-menstrual theory " of sex causation.

This idea I find, like a great majority of others, has no foundation of fact to rest on; and I am further struck with the self-condemnatory fact that, while one section of the public believes that *just before* a period gives a boy, and *after* a girl; an equally numerous section believes just the opposite—viz. that *just before* a period gives a girl, and *after* a boy.

I have no hesitation in saying that both are entirely wrong, and that the time of fertilisation is quite immaterial; and I have by me a large number of clinical cases in detail to disprove either contention.

First pointing out the difficulty of explaining by this view those cases where pregnancy occurs before menstruation has ever begun, as in young girls in hot climates especially—for the children in such cases are not of one sex only—as well as those cases of pregnancy after the cessation of menstruation; there are the quite numerous cases to explain of pregnancy occurring during the lactational absence of menstruation, where also the children are not of one sex only, as they should be if the ovum fertilised prior to the menstrual show always gave children of one sex only.

The following extracts from letters from patients serve to show how worthless the idea is.

Mrs. P. C. R. writes: "This date [of insemination] was just *before* the period"—a girl was born; and "the last girl was just *after*, so THAT idea is knocked on the head and proved." Emphasised words as in original letter.

This case is most convincing, as the patient, who most earnestly longed for a boy, had been strongly advised to attempt fertilisation only *after* a period. This she did, and obtained a girl. Being then advised by other friends to try just *before* the period, and a boy would surely result, she obtained the second girl she writes of above. So that this one patient disproves both ideas. It shows, as I contend, that a girl can be obtained by either pre- or post-menstrual fertilisation, *provided the ovum is female.*

Mrs. V. B., who has had four boys and no girls, writes thus: "I think all my babies have been started directly *after* a period."

This case necessarily disproves the idea that girls are due to fertilisation just *after* the period only, though supporting the idea that this leads to the birth of a boy.

Mrs. G. W., who has had three girls, writes that she has "found that immediately *after* has produced my girls."

This case and the previous one remarkably contradict each other.

Mrs. L. P. writes in her letters to me thus (the words in italic are emphasised in the original letters): "I am anxious to have a son, and have already had two daughters. One thing I do know is that both my girls have been made the day *after* my period is over. It is no use my trying *directly after;* I am sure it would be a girl, for directly *after* the period has meant a daughter each time so far." After consulting me, I wrote and advised that the time of fertilisation was immaterial, as long as the correct ovum was fertilised according to my rules. She wrote me later thus: "I am going to have a baby. It was directly *after* my monthly trouble. *I followed your advice entirely*, and this is the result." "My little son was born quite hale and hearty, a splendid specimen."

Here is a case of a patient getting her desired son by fertilisation directly after the period I advised, although she had been convinced that directly after led always to

a girl. It shows that post-menstrual fertilisation can give either sex. She had had two girls by post-menstrual fertilisation, and secured her boy also by post-menstrual fertilisation, because the ovum of that period was, as I had told her, a male one. I had correctly determined the sex of her next child for her.

Mrs. R. V. had two boys. Insemination in both cases took place only just *after* the period ceased. She then had a girl, owing, she says, to "connection in the last two weeks of her menstrual interval only"—*i.e.* just before the next period began.

This case shows two boys post-menstrual, and a girl pre-menstrual.

Mrs. S. C. B. had her children thus:

1. A boy, December 24, 1902; born on actual day expected.
2. A girl, August 18, 1905; expected on August 21.

"In both cases insemination took place immediately *after* a period." "No precautions were taken just *before* a period, but always *after* one, except when the second child was wanted."

Here we see a child of each sex due to fertilisation after a period, showing it is not the time of fertilisation which counts.

Mrs. S. H. D. had one girl followed by four boys—thus:

First child: Girl stillborn May 7, 1907. No other details obtainable.

Second child: Last seen period began July 15, stopped July 20, 1907. Only inseminations: July 21, 22, 23, 1907. Boy born April 30, 1908; expected April 27 to 29, 1908.

Third child: Last seen period began April 25, stopped May 1, 1909. Inseminations: May 8 and May 30, 1909. Boy born February 17, 1910; expected February 12, 1910.

Fourth child: Last seen period began May 23, stopped May 29, 1911. Inseminations: May 30 and June 4, 1911. Boy born February 27, 1912; expected March 6 to 11, 1912.

Fifth child: Last period began February 24, stopped March 1, 1914. Inseminations: March 2, 6, 9, 1914. Boy born December 9, 1914; expected December 7 to 14, 1914.

It is evident in No. 3 that the May 8 insemination fertilised the ovum of the last period seen, because the next period due (? May 23) did not appear, and on May 30 she was already pregnant.

Tabulated the births come thus:

1. Girl, May 7, 1907.
   Stillborn.] X
2. Boy, April 30, 1908.]
3. Boy, February 17, 1910.] R
4. Boy, February 27, 1912.] R
5. Boy, December 9, 1914.] R

If April 30, the date of No. 2, had been a few days earlier — *i.e.* post-maturity—he would still be right with No. 3, but wrong with No. 1; whereas if the birth is reckoned as a May one (prematurity), it comes correct to No. 1, but wrong with No. 3. The case supports my theory fully, and also shows that post-menstrual impregnation in this case gave rise to four boys. I contend the time of fertilisation is immaterial to sex production; it depends on what ovum is then available.

I now give short details of some others of my actual cases.

Mrs. L. C.: Last menstrual period stopped April 19, 1901. Coitus April 25, 1901. Boy born January 21, 1902; expected January 24, 1902.

Mrs. R.: Last period stopped August 2, 1901. Coitus August 5, 1901. Boy born May 2, 1902; expected May 10, 1902.

Mrs. B. H.: Period stopped January 5, 1912. Coitus January 6, 1912. Boy born October 8, 1912; expected October 12, 1912.

Mrs. S.: Period stopped March 23, 1911. Coitus March 24, 1911. Boy born December 25, 1911; expected December 28, 1911.

Mrs. B.: Last period stopped December 13, 1905. Coitus December 17, 1905. Girl born September 19, 1906; expected September 23, 1906.

Mrs. C. T.: Period stopped January 6, 1913. Coitus January 11, 1913. Girl born October 10, 1913; expected October 9, 1913.

Mrs. C. C.: Period stopped April 25, 1908. Coitus April 26, 1908. Girl born January 31, 1909. Child born exactly 280 days after.

Mrs. J.: Period stopped August 9, 1909. Coitus August 11, 1909. Girl born May 24, 1910; expected May 16, 1910.

The former four cases show boys born as a result of fertilisation immediately after cessation of a period; the second four cases show girls born under similar conditions.

Mrs. B. T.: Period stopped December 5, 1909. Coitus December 28, 1909. Girl born September 10, 1910; expected first week in October. Period due January 1910 did not appear.

The above is a case of pre-menstrual fertilisation, so that the shortly expected period—viz. in January—did not appear. A girl was born.

Somewhat resembling the pre- and post-menstrual theory of sex causation is the view originated by Thury of Geneva, that sex was due to a difference in the "degree of ripeness" of the ovum when fertilised.

It was supposed that if the ovum was imperfectly ripe when fertilised a female resulted; if quite or fully ripe or stale, a male was produced. Further, it was believed that the ovum became more and more ripe as time elapsed between its leaving the ovary and its becoming fertilised—that is, as it travelled along the genital tract from the ovary to the uterus—so that an ovum fertilised just before or a very *short* time *after* being shed (ovulation) was supposed to lead always to a female; and fertilisation postponed several days, till after the ovum had at least reached the uterus, led always to a male.

That is, early fertilisation of the ovum led to females, while late fertilisation led to males; hence one ovum was supposed to be able to produce either males or females.

We have, however, no means of judging of the "ripeness" of an ovum, and it is an assumption to allege that a lesser or greater degree of ripeness (not the technical maturation) is acquired by the ovum on its journey from ovary to uterus. In fact, the "maturation" of the ovum takes place chiefly in the Graafian follicle, before it is discharged therefrom.

There are certainly no facts to show that an ovum is ever shed from a Graafian follicle in the ovary until it is sufficiently ripe for fertilisation, and the occurrence of ovarian pregnancy *proves* this is so; for the ovum is actually fertilised while still in the Graafian follicle, and we have no reason to believe such cases are necessarily always girls, as they should be if early fertilisation leads to females always. On the other hand, in Chapter IX., p. 74, we have three cases of ovarian pregnancy, two being males and one female.

We know pretty well that, though the ovum *may* be fertilised anywhere in the genital tract, from the Graafian

or ovarian follicle down to the lower end of the uterine cavity, the most usual site of fertilisation is the outer or expanded portion of the Fallopian tube—*i.e.* the portion nearest the ovary. And thus, not having travelled far *from* the ovary to reach this part of the Fallopian tube, the ovum should on this view be not "fully ripe," so that most, if not all, tubal pregnancies should be females, which they most certainly are not; as well as a goodly proportion of *all* children, as the tube is believed to be the *usual* site for fertilisation. Male children, on the other hand, would arise only from the few ova which, escaping fertilisation in the Fallopian tube, had become "fully ripe" or stale by the time of their arrival in the uterine cavity, and, being fertilised there, should give rise to males only. Boys would therefore be in a great minority, but the simple fact that everywhere more boys are always born than girls should surely disprove this idea.

Schröder years ago collected a number of cases of pregnancy where the women knew the date of the last period, and also the date of the only insemination. He found that boys were conceived on an average 10 days after menstruation, and girls were conceived on an average $9\frac{3}{4}$ days after menstruation—*i.e.* practically an identical time. So these cases disprove both Thury's hypothesis and the pre- and post-menstruation idea.

CHAPTER XXVI

THE DETERMINATION OR PRODUCTION OF EITHER SEX AT WILL

FROM what has been shown in the former chapters it is abundantly evident that the production of either sex at will, must consist in avoiding any attempt at fertilisation in the months during which an ovum is produced of the sex which is not desired.

Hence to secure a different sex child to the child last born, we must first find the ovulation month of the last child—*i.e.* the month during which the ovum shed was fertilised, according to the rules laid down in the last chapter.

The sex being already known, we then reckon alternately month by month and so find the months which correspond in sex to the one which provided the last ovum; during these months, therefore, no intercourse must take place.

If fertilisation then ensues, during one of the other months, we shall certainly obtain a child of the opposite sex to that last born. By this plan I have been able to secure to many members of the nobility and aristocracy, etc., as well as to members of my own profession, that the birth of a son and heir shall take place—in some cases on more than one occasion—and from many of them I have received letters of very grateful thanks.

I have also in other cases, where a girl was desired, in like manner correctly determined that the sex of the next child should be female as wished.

I have besides definite evidence that readers have benefited by the book and correctly determined the sex of their next child for themselves; though doubtless I have not heard from some who, through want of appreciation of some of the difficulties, have failed in their endeavour.

Much of the unhappiness in Royal and other houses is due to a certain amount of ill-luck or misfortune in always unintentionally catching the same sex ovulation.

The Empress of Russia can certainly claim to have created the greatest, even international, interest as to the sex of her coming children. It was always reported, and never officially contradicted, that the Czarina, after consulting the late Professor Schenk, had adopted his directions with a view to ensure the birth of a son. Hopeless failure, however, attended these efforts, and on two occasions at least a daughter was born instead of the wished-for son, who was eventually born two years after Professor Schenk's death.

Why the Czarina did have four daughters consecutively, and at last a son, is because on four occasions a female ovulation was unfortunately fertilised; and on three of these occasions this could have been easily avoided by calculating on my method the sex of the ovulation month. The sex of the last three children was on each occasion foretold correctly by me.

The Czarina has had five living children, thus:

Princess Olga, born November 15, 1895.
Princess Tatiana, born June 10, 1897.
Princess Marie, born June 26, 1899.
Princess Anastasia, born June 18, 1901.
Prince Alexis, born August 12, 1904.

The Czarina gave birth, then, to a girl (Princess Olga) on November 15, 1895. Tracing back 280 days or 40 weeks, we find that the ovulation fertilised took place in the first week of February 1895; so, February 1895 being a female ovulation, gave rise on November 15, 1895, to the birth of a girl, Princess Olga.

The next child, a girl, Princess Tatiana, was born in June 1897. Now 40 weeks back make the ovulation in September 1896. As February 1895 was a female ovulation, February 1896 was a male ovulation; so March 1896 would be a female, April a male, May a female, June a male, July a female, August a male; and September 1896 was a female ovulation, therefore a girl was born in June 1897.

The third child, Princess Marie, was born in June 1899,

that is, the same month two years later—the sex, as I have pointed out in the last chapter, being therefore the same. The ovulation month would again be September of 1898, and as September 1896 was a female ovulation, September 1897 would be a male, and September 1898 was the female ovulation which led to the birth of Princess Marie.

Similarly, Princess Anastasia was born in the same month, June, of 1901—*i.e.* two years after Princess Marie. Here again the ovulation month would be September of 1900; and as September 1898 was a female ovulation, September 1899 would be a male, and September 1900 a female; hence Princess Anastasia was born.

The birth, then, of these three princesses successively after the first is thus easily accounted for.

The long-wished-for heir, the Cesarewitch, was born in August 1904. Tracing back, we find that the ovulation month must have been November 1903. If, therefore, September 1900 was a female ovulation period, and produced the Princess Anastasia, we know that September 1901 would be a male, September 1902 a female, and September 1903 a male ovulation period; therefore October 1903 would be a female ovulation, and November 1903 was a male ovulation, which being fertilised, the long-looked-for son and heir was duly born in August 1904, his birth being by this plan correctly foretold by me.

The details of the family of the Queen of Spain are most interesting, and confirmatory also.

1. Boy, Prince of Asturias, born May 10, 1907.] R
2. Boy, Prince Jaime, born June 23, 1908.] R
3. Girl, Princess Beatrice, born June 22, 1909.] X
4. Boy, premature and stillborn, May 21, 1910.] R
   This child was expected in June 1910.] X
   (See note.)] X
5. Girl, Princess Maria, born December 12, 1911.] X
6. Boy, Prince Juan, born June 20, 1913.] X
7. Boy, Prince Gonzale, born October 24, 1914.] X

The Queen of Spain gave birth to a boy (Prince of Asturias) on May 10, 1907. Tracing back 280 days, or 40 weeks, we find the ovulation fertilised was in the first week of August 1906, and, being a male, gave rise on May 10, 1907, to the birth of a son, the Prince of Asturias.

The next child, a boy, Prince Jaime, was born June 23, 1908, and 40 weeks back makes the ovulation in September 1907. As August 1906 was a male ovulation, August 1907 was a female ovulation, so the next month, September 1907, would be the male ovulation, and therefrom a boy, Prince Jaime, was born in June 1908.

Similarly, the next child, a girl, Princess Beatrice, being born in the same month (June) of the next year means that the September ovulation of the year following to that which gave rise to Prince Jaime, being fertilised, a girl resulted; for September 1907 being a male ovulation, September 1908 would be a female, and the Princess was born in June 1909.

The next child (No. 4) was prematurely born dead. Here again the child was expected in June 1910, and had he been born then would have likewise supported my theory. His birth in May 1910, however, comes wrong from the dates of Princess Beatrice, and, as pointed out in the previous chapter, this premature and immature birth so upset and interfered with the normal ovulation rhythm that the next children also come wrong, Princess Maria coming wrong from No. 4; and Princes Juan and Gonzale coming wrong from Princess Maria and each other, as well as from either Prince Jaime or Princess Beatrice.

The case furnishes a very good example, in the first three children, of the accuracy of the theory, besides being an example of how premature births upset the rhythm and calculations for subsequent ones.

NOTE.—On February 1, 1910, a statement appeared in the London newspapers that the accouchement of the Queen of Spain was expected in May 1910. On the strength of that statement I foretold to many that the child would be a girl in *May*.

On May 16, 1910, there appeared an announcement from the Madrid official journal that "Queen Victoria Eugenie's confinement is expected in about a month's time." I therefore corrected my prophecy to the child being a boy, if born in June 1910; as I should have originally predicted had the month of birth been given as June. Why the child was prematurely stillborn in May, so making my prophecy and my theory look incorrect, I now propose to show.

At midnight on May 6, 1910, the Queen of Spain's uncle, King Edward VII. died unexpectedly, and there can be little doubt that the shock of this news, together with the hurried departure for

England of her mother, the Princess Henry of Battenberg, and later of her husband, the King of Spain, leaving her quite alone (for she had not even her English nurse near her), combined to upset her and killed the child; for unexpected premature labour pains set in on May 18, though we had only just read in the papers of May 16 that labour was "expected in about a month's time." The funeral of her uncle, King Edward VII., was on May 20, and she was confined at 2.30 a.m., May 21, 1910, of a stillborn male child, though "the accouchement had been normal, without complication," showing it was not the labour which had killed the child, but the death of the child had induced the onset of labour.

The English nurse, who would most certainly have been in readiness and waiting had the confinement been then expected, after evidently being hurriedly sent for when the pains started, as recorded on May 18,—"arrived on the night of the 20th"—*i.e.*, a few hours only before the birth, in the early morning of May 21, 1910.

That this child (a boy) was *prematurely* born in *May*, though not expected till June, is evident by—

(*a*) The statement in the Madrid official journal that the confinement was due about a month later than May 15-16—*i.e.*, mid-June 1910.

(*b*) The fact that the child was stillborn though the labour was normal and uncomplicated.

(*c*) The absence of her English nurse, who would certainly have been sent for, and kept in Madrid in readiness, if the labour had been expected when it took place. Her distance of living from her case would have been a reason for having her at hand, as is done by many ladies, a week or more before the expected date of confinement.

(*d*) It is probable that her mother and husband would not both have left her had the confinement been due when it actually took place.

Taking these things into consideration, I have no hesitation in saying that the Queen of Spain's fourth child, a male, stillborn on May 21, 1910, was prematurely born, and was not really due till June 1910. And so the case further supports my theory, and my forecast was essentially correct—viz., a female, if full time, in May, and consequently a male in June.

We may possibly some day, by means of some modification of the Röntgen or other rays, be able to actually see an ovary ovulate. This should not sound so improbable when we recall how impossible the location of swallowed objects, bullets, and other foreign bodies, besides views of fractured bones, would have been thought before the discovery of the Röntgen rays.

Efforts are even now being made to show the action of

the heart in situ; and who can say that an ovary ovulating will be an impossible view in the future?

If this ever comes to pass, the solving of the problem how a Royal house would be able to avoid the birth of a princess when a prince was wanted, would be rendered quite easy; it would allow even the *first* child to be a boy if so desired. Until the right or male ovary was seen to ovulate, sexual congress would be prohibited; then, if fertilisation followed, the desired prince would be born. There are still many houses awaiting such an event with anxiety.

Until such time, therefore, as we can see an ovary ovulate, we must be content to work out, from the data of a previous child's birth, which ovary is working during certain months.

This plan, I maintain, succeeds for births after the first; but I am quite unable to determine the sex of the firstborn.

But this matters only slightly; it is only after the birth of at least one child that the parents begin to wish for a child of different sex. This, my plan now teaches them how to achieve, though there are several pitfalls for the amateur sex determinator.

INDEX

ABDUL-HAMID, 71.
Abernethy, 100.
Addinsell, A. W., 24, 26.
Adhesions, absorption of, 131.
— render removal of ovary or tumour difficult or incomplete, 73, 168.
Adverse cases, so-called, 157.
Ages, relative, of parents theory, 52.
— — — disproved, 123.
Albertus Magnus, 54, 115.
Alecithal ova, 35.
Anabolism, 52.
Anaxagoras, 54.
Anderson, Wm., 108.
Andrews, H. Russell, 69, 71, 148, 152.
Animals, offspring of, all one sex, 61, 62.
Artifacts, 31.
Avicenna, 54, 115.

Baldwin, 158, 161.
Ballantyne, J. W., 39, 42, 150, 151, 157, 159, 161, 163, 171.
Barker, Fordyce, 83.
Barnes, R., 91.
Bate, G., 138.
Baudouin, 141, 144.
Beigel, 161.
Berner and Stieda, 53.
Bernutz and Goupil, 74.
Bertillon, 113.
Billroth, 178.
Birnbaum, 134, 152.
Birth-rate of boys and girls, 105, 171.
Bischoff, 90, 100.
Blacker, G. F., 154.
Bland-Sutton, Sir J., 21, 26, 51, 68, 86, 88, 91, 94, 126, 154, 162-166, 178.
Blomfield, J. E., 151.
Bonamy and Beau, 109.
Bond, C. J., 150.
Boxall, R., 92.
Boyd, Mrs. Stanley, 73, 81, 131.
Boys, birth-rate of, 105, 171.
— due to right-sided ova, 54.
— — to spermatozoa, 54.
— more than girls in sextuplets, 141.
— — — — in triplets, 139.
— one, followed by several girls, 129.
— only in family, 128.
— proportion of illegitimate, to girls, 113.
— proportion of stillborn, to girls, 106.
— several, followed by one girl, 130.
— twin, 110.
— twin, more numerous than girl twins, 133.
— why more than girls, 105.
Braun, Von, 119.
Breasts alternately painful, 176.
— abscesses of, 178.
Bryce, 38.
Burdach, 53.

Campbell, H., 106.
Canestrini, 52.
Carpenter, W. C., 61.
Castration, incomplete, of cockerels, 168.
Children, all one sex, 127.
— — — — after unilateral ovariotomy, 76.
— — — — by different men, 58, 59.
— different sex by different wives of one husband, 59, 60.
— diseased, due to a diseased ovary or ova, 146.
— of alternate sex in one family, 123.
— of Czarina, 215.
— of one sex only, diseased, 146.
— — — — monstrosities, 151.
— sequences of, of same sex, 128.
Churchill, 133.
Colour blindness, 153.
— of hair identical in uniovular twins, 136.

Conceptions, male exceed female, 106.
— multiple, 132.
Condamin, 166.
Cornual pregnancy, 84.
Corpora lutea in rabbits' ovaries, 100.
— — in sows' ovaries, 137.
— — scars from, equal the number of menstrual periods, 49, 50.
— — two in one ovary, 134, 153.
Corpus luteum, 19
— — after removal of both ovaries, 165.
— — due to fibroids, 87.
— — in monotocous animals, 101.
— — in polytocous animals, 51, 103.
— — in a tubal fringe, 167.
— — in tubal abortion, 88.
— — sign of previous ovulation, 20, 86.
— — true, a sign of pregnancy, 86.
Cory, Robert, 23.
Cow, calves of a, all one sex, 62.
— pregnant uterus of, 101.
Cripps, H., 92.
Croom, J. H., 158.
Cullingworth, C. J., 68, 70, 72, 87, 92, 164.
Cunningham, 8, 41.
Czarina's children, 215.

Dauber, J. H., 159.
Dawson, E. Rumley, 54, 63, 67, 131.
Death-rate in boys and girls, 106.
Decubitus and sex, 115.
Dermoids, 166.
Determination, the, of sex, 214.
Deutoplasm, 35.
Dix, W. R., 144.
Doncaster, L., 103, 201.
Doran, Alban, 29, 79, 93, 157, 162, 164, 169.
Dorland, 118.
Double uterus, 83.
Drennan, T. G., 177.
Duncan, Wm., 68.
Dyball, B., 68.

Eden, T. W., 39, 167.
Ellis, Havelock, 55, 105, 153.
Emmett, T. A., 171.
Endometrium, 23.
Engel, 170.
Esquimaux, ovulation in, arrested by cold, 29, 30.
Etchecoin, 140.
Evans, J. H., 152.
External migration of ovum, 90.
Extra-uterine pregnancies, 67.

Fallopian tubes, 11.
— — function of, 12.
— — length, abnormal, of, 94.
— — lie on different levels, 6, 111.
— — misplaced, 94.
— — mobility of, 11, 93.
— — receptacles for semen, 44, 111.
Family, normal, contains both sexed children, 115.
Farre, 99.
Father does not cause sex, 47, 56.
Fertilisation, 38.
— due to father only, 58.
— in invertebrate, 40.
— not observed in mankind, 39.
— number of spermatozoa requisite for human, 39.
— pre- and post-menstrual, 208.
— site of, 43, 95.
Fordyce Barker, 83.
Forecasting sex of unborn child, 181.
Free-martin, 155.
Freureisz, 139.

Galabin, A. L., 87, 91, 110, 126, 162, 166.
Galen, 48, 54.
Garrigues, H. J., 7, 8, 12, 17, 43, 44, 51, 100, 110, 132, 175.
Geddes and Thomson, 23, 52.
Germinal spot, 16, 34.
— vesicle, 16, 34.
Gerrish, 9, 41, 66, 127.
Giles, A. E., 82, 94.
Girdwood, 50.
Girls, illegitimate, proportion of, to boys, 113.
— and girl twins, 137.
— one, followed by several boys, 129.
— only in family, 128.
— proportion of stillborn, 106.
— several, followed by one boy, 130.
Girou, 53.
Glockner, 95.
Gowers, Sir Wm., 104.
Graaf, R. de, 14.
Graafian follicle, 14, 15.
— containing two ova, 16, 135, 138.
— contents of, 16.
— number of, 14, 28, 32.
— rupture of a, 18.
Grimsdale, T. B., 17.

Halliburton, W. D., 17, 32, 43, 127, 128.
Handfield-Jones, M., 83.
Hann, R. G., 26.
Hart, B., 11, 109, 135.
— and Barbour, 7, 125, 131.

Heape, 24, 52, 179.
Hegar, 151.
Heil, Karl, 23.
Heisler, J. C., 16, 17, 26, 27, 42.
Hellier, J. B., 71.
Hellin, 143.
Hencke, 48, 54.
Heredity due to both parents, 58.
Herff, von, 136.
Herman, G. E., 21, 48, 65, 87, 91, 94, 131, 166.
Hermaphroditism, 154.
Hippocrates, 47, 54.
Hirst, B. C., 19, 86, 90, 135.
Hofacker and Sadler, 53.
Holoblastic ovum, 40.
Homologous twins, 135.
— often conjoined, 138.
Horrocks, P., 24, 31.
Hurst, C. C., 201.
Hutchinson, Sir J., 72.
Hutchison, R., 152.

Illegitimacy, 112.
Inflammation of Fallopian tube, 124.
Internal migration of ovum, 90, 95.

Jardine, R., 22.
Jellett, H., 22.
Jewett, 110, 133.
Jews, male birth-rate of, 112.
Johnstone, A., 98.
Jones, Mary Dixon, 150.
Jurinka, 83, 171.

Katabolism, 52.
Kelly, Howard, 85, 92, 94.
Keraval, 146.
Knight, 61.
Kossmann, 152.
Krusen, W., 139.
Kussmaul, 90, 96.

Lactation, unilateral, 177.
Lee, R., 51.
Leeuwenhoek, 47.
Lefas, 167.
Left side of body weaker than right, 48.
— ovary smaller than right, 12, 108.
— ova are female, 48, 57.
Leguen, 177.
Lenhossék, 57.
Leopold, 30.
Lewers, A. H., 68, 69, 81, 84.
Liquor folliculi, 14.
Lockyer, C., 152, 162, 171.
Lode, 142.
Lusk, 83, 135.

McKerron, R. G., 78.
Macnaughton-Jones, H., 22, 64, 78.
Magnus, Albertus, 54, 115.
Malcolm, J. D., 169.
Man does not cause sex, 47, 56, 58.
Manton, W. P., 163.
Marchand, F., 152.
Mare's foals all one sex, 62.
Marshall, F. H., 24.
Mathew, Porter, 110.
Mayerhofer, 53.
Menopause, 22.
— hæmorrhage after, 30.
— pregnancy after, 26.
Menstruation, 22.
— alternate, indicates alternate ovulation, 171.
— — good and bad periods, 171.
— dependent on ovarian tissue, 31, 165, 167.
— number of periods equalled by number of ovulation scars, 50.
— phenomena of, 24.
— pregnancy prior to onset of, 26
— prolonged, 23.
— stopped by Arctic cold, 29.
Meredith, W. A., 64.
Meroblastic ovum, 40.
Micropyle, 34, 41.
Migration of ovum, 45, 90.
Milander, 126.
Millot, 115.
Monorchids, 60.
Montgomery, W. F., 11, 66, 135, 137.
Moorhead, T. G., 7, 49.
Morgagni, 167.
Morris, H., 12.
Multiple pregnancy, 132.
— — due to mother, 143.
Mylvaganam, H. B., 79.

Nagel, 136, 156.
Napheys, G. H., 144.
Négrier, 49, 170.
Nijhoff, 141.
Norris and Dickinson, 136.
Nuclei, two in one ovum, 135.
Nucleoli, two in one nucleus, 136
Nucleolus, 16, 35.
Nucleus of ovum, 16, 34.
— double, 16.
— fertilisation of, 35, 45.

Offspring all same sex in quadrupeds, 61.
Ollivier, 83.
Olshausen, 80, 164.
Oöcyte, 16, 17, 32.
Oösperm, 38.
— site of attachment, 44.

Opitz, 69.
Ovarian follicle. *Cf.* Graafian follicle.
— pregnancy, 74.
— tissue, 160.
— — in ovarian ligament, 157, 163.
— — in between layers of broad ligament, 160, 161.
— — small piece can ovulate, 166, 167.
— — unremoved portions of, growth of, 168.
— — — leading to pregnancy, 164.
— — — — to tumours, 169.
Ovaries, absence of one, 126.
— accessory, 161, 163.
— adhesions cause incomplete removal of, 168.
— alternate action of, 49, 51, 170.
— anatomy of, 12.
— bilateral removal, effects of, 80.
— cirrhosis of, 126.
— containing two corpora lutea, 134, 153.
— diseased, 146.
— essential factor in causation of sex, 46.
— growth of unremoved portions of, 168.
— ovulation from, 17, 28, 166, 170.
— — scars in, 29.
— pregnancy in, 74.
— resection of, 80, 168.
— right larger than left, 12, 108.
— — provides male ova, 47, 108.
— rudimentary condition of, 125.
— unequal size of, 12, 108.
Ovariotomy, bilateral, 80.
— effects of, on child-bearing, 76.
— growth of tumour after, 168.
— incomplete, 164, 165, 168.
— pregnancy after, 164.
— unilateral, causes unilateral sterility, 127.
Oviduct. *Cf.* Fallopian tube.
Ovisac. *Cf.* Graafian follicle.
Ovulation, 17, 166, 170.
— after removal of one ovary, 180.
— alternate, 49, 51, 170.
— occurs about the time of a menstrual period, 28.
— precedes menstruation, 177.
— scars of, equal to number of periods, 29, 49, 50, 51.
— stopped by Arctic cold, 29.
— unilateral, 49, 170.
— — in monotocous animals, 52, 179.
— without menstruation, 27.
Ovum, 15, 16, 30, 38.
— alecithal, 35.
Ovum determines the sex, 48, 57.
— embedding of, 44, 99.
— fertilisation of, 38, 58.
— formation of, 32.
— holoblastic, 40.
— human, 34.
— invertebrates, 41.
— meroblastic, 40.
— migration of, 45, 90.
— Peters', 38.
— sex of, 33, 47, 57.
— structure of, 33.
— telolecithal, 35.
— transmigration of, 90.
— with two nuclei, 135.
— yolk of, 35.

Parry, 89.
Parvin, 7, 80, 108, 110.
Perivitelline fluid, 33.
— space, 33.
Peters, Hubert, ovum of, 38.
Phillips, J., 51.
Piersol, 14, 21, 108, 135.
Pinard and Magnan, 106.
Pinesse, 165.
Placental site, 44, 119.
Playfair, W. S., 6, 19, 110, 132-136.
Plural pregnancy, 132, 142.
Pocock, 67.
Pollock, R., 95.
Polyspermy, 41, 43.
— sex due to, 52.
Popow, 87.
Power, John, 23.
Prediction of sex, 181.
— difficulties and errors in, 197.
Pregnancy after double ovariotomy, 80, 164.
— — menopause, 26.
— — unilateral ovariotomy, 76.
— and dermoids, 166.
— cases of repeated plural, 143, 144.
— corpus luteum sign of, 86.
— duration of, 183.
— in abnormal uteri, 82.
— in cow, 101.
— in mammalia, 97.
— in rudimentary cornu, 84.
— in sheep, 103.
— multiple, in rabbits, etc., 100.
— ovarian, 74, 75.
— plural, 132, 142.
— — due to woman, 142.
— — repeated, 143, 144.
— prior to menstruation, 26.
— tubal, 67 *et seq.*
Pre- and post-maturity, 197, 203.
Pre- and post-menstruation theory of sex determination, 208.

Puberty, 20.
Puech, 142.

Quadruplets, 140.
Quintuplets, 141.

Ratcliffe, J. R., 101.
Rauber, 112.
Raviart, 146.
Rectum, 7.
Reeves, H. A., 75, 126.
Reichert, 35.
Remfrey, L., 23, 27.
Richet, 9, 96.
Right ovary larger than left, 12, 108.
— ova are male, 48, 57.
Roberts, Lloyd, 141, 143.
Robin, 53.
Robinson, Byron, 93.
Romme, 53.
Ross, J., 52.
Routh, Amand, 65, 68, 77, 165, 168.
Rumpe, 110, 133.
Russia, Empress of, children of, 215.
Ruth, 73.

Sadler, 53.
Saleeby, C. W., 106.
Salpingitis, 125.
Saniter, 138.
Schenk, 113, 215.
Schroeder, 135.
Scott, Michael, 54.
Sea-urchins, 40.
Seligson, 74.
Sex, determination of, 214.
— due to age of parents, 53.
— — to spermatozoa, 52, 54.
— — to vigour of parents, 53.
— — to woman only, 47, 58.
— families of children all the same, 127, 128.
— prediction of, 181.
— — of twins, 191.
Sexes, proportion of, in individual families, 122.
Sexify, 47, 58.
Sextuplets, 141.
Slamjer, 71.
Smith, A., 73.
Smith, Sir T. R., 84.
Snow, L. M., 180.
Spain, Queen of, children of, 216.
Spencer, H. R., 64, 126, 168.
Spermatozoa, 36.
— do not influence sex, 47, 48, 57.
— how they enter the ovum, 37, 41.
— motility of, 37, 117.
— number requisite for fertilisation in invertebrates, 34, 39.
— source of, 36.
Spiegelberg, 7, 20, 117.
Starfish, 41.
Sterility, causes of, 125.
— unilateral, 124.
Stevens, T. G., 12, 14, 22, 25.
Stieda, 53.
Stillbirth, 106.
Stillborn boys, proportion of, to girls, 106.
Strassmann, 24, 29, 171.
Stretton, L., 73.
Striæ of zona pellucida, 33, 41.
— — — functions of, 41.
Sturmer, A. J., 69.
Sutton, Bland. *Cf.* Bland-Sutton.
Sutton, Stansbury, 159.

Tait, Lawson, 72.
Targett, J. H., 77, 84.
Tarnier and Budin, 148.
Taylor, J. W., 69.
Teacher, J., 38, 42.
Temesvary, 26, 176.
Testicles, growth of unremoved portions of, in cockerels, 168.
— congenital absence of one, 60.
— removal of one, affects not the sex of offspring, 62.
Theory, the, 46.
— proved by pregnancy in abnormal uteri, 82.
— — — — in normal uteri, 63.
— — by extra-uterine pregnancy, 67.
— — by ovarian pregnancy, 74, 75.
— — by tubal pregnancy, 67.
Thompson, G. W., 139.
Thury, 212.
Tilt, E. J., 22, 30, 176.
Transmigration of ovum, 90.
Triplets, 138.
Tubal pregnancy, 67.
— — repeated, 69.
Tubby, A. H., 153.
Tuckey, P., 53, 118.
Tufnell, 63, 134.
Tumour, dermoid, 166.
— growth of ovarian, after double ovariotomy, 168.
— incomplete removal of, due to adhesions, 169.
— removal of, not synonymous with removal of all ovarian tissue, 81, 162, 169.
Twins, 132.
— binovular, 132, 133.
— boy and girl, 137.
— conjoined, 135.
— followed by child of opposite sex, 130.

Twins, forecasting sex of, 191.
— homologous, *vel* identical, 135.
— impotency of, 155.
— insanity in, 146.
— male more numerous than female, 109.
— pigeon-pair, 137.
— sex of, 137.
— uniovular, 135.
— varieties of, 133.

Unilateral sterility, 124.
Uniovular quadruplets, 140.
— triplets, 138.
Uterus, abnormal, 10, 82.
— anatomy of, 5.
— cavity of, 9.
— cervix of, 6, 9.
— cornu of, 9, 82.
— double, 83.
— function of, 10.
— horns of, 9, 82.
— internal diameter of, 9, 96.
— mammalian, 98.
— posterior view of, 116.
— relations of, 7, 8.
— sheep's, 97.
— two halves of, menstruate alternately, 170.

Van Lint, 53.
Veit, 110, 132.
Vigour, relative, of parents theory, 53.
— — — disproved, 123.
Vilson, 53.
Vitelline membrane, 33.
Voron, 139.
Vortisch, 143.

Waldeyer, 135.
Walls, W. K., 83.
Walter, W., 158.
Warnek, 73.
Webster, Clarence, 108.
Wetherell, J. A., 76.
White, C., 141.
Williams, Whitridge, 14, 20, 21, 28, 30, 38, 88, 91, 136, 138.
Williamson, H., 84, 92.
Will-Jill, 154.
Willoughby, Sir Francis, 128.
Wilson, Andrew, 52.
— Thomas, 94, 136.

Zona pellucida, 33.
— — give the spermatozoa access to ovum, 42.
— striata, 33.

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